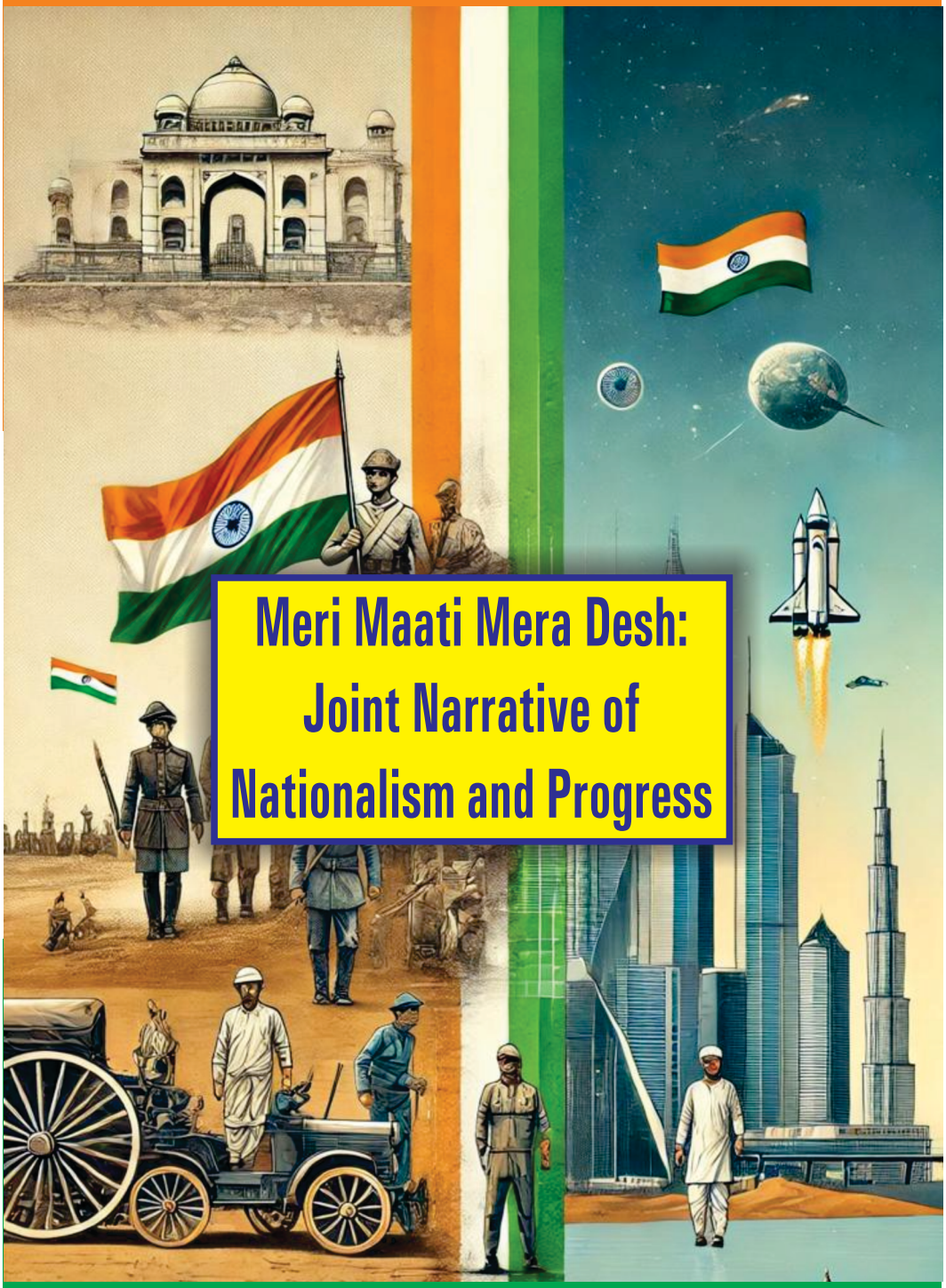

Meri Maati Mera Desh: Joint Narrative of Nationalism and Progress

JAGRITI MADAN DHINGRA | BABY TABASSUM | MUJAHID ALI | VIJAY KUMAR RAI

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(Compandium of Papers)

Editors:
Jagriti Madan Dhingra
Baby Tabassum
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Published by:
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Message

It is a true honor to welcome this esteemed gathering of scholars, educators, and researchers to this important national seminar, "Meri Mati Mera Desh: Rashtriyata aur Vikas ki Sanyukt Gaatha." This seminar reflects our shared dedication to exploring and celebrating our nation's extraordinary journey, a journey marked by sacrifice, resilience, and a constant pursuit of progress.“Uttar Pradesh, rich in history and a vital contributor to India's freedom movement, has always been central to this transformative process. From the echoes of early uprisings in cities like Meerut, Kanpur, and Lucknow, to the intellectual and cultural flourishing nurtured by visionaries in Banaras, Prayagraj, and Aligarh, our state has been both the birthplace and the driving force of India's nationalist spirit. It is therefore particularly fitting that this significant academic discussion is taking place within this dynamic intellectual environment, where the past informs the present and shapes the future.“Education is more than just imparting knowledge; it builds a bridge between historical awareness and current realities. As we delve into the evolution of Indian nationalism and development, we must acknowledge the crucial role of education in empowering individuals, fostering innovation, and strengthening our nation's democracy. This seminar’s focus on India’s scientific heritage—drawing from the wisdom of ancient texts—reminds us that our intellectual traditions have always looked forward, integrating ancient knowledge with modern progress.“I offer my sincere thanks to the organizers for creating this valuable platform and to all the participants whose research and insights will undoubtedly deepen our understanding of India's historical and developmental path. May this seminar spark new ideas, encourage productive conversations, and reinforce our shared commitment to building a self-reliant, progressive, and culturally vibrant India.“I wish everyone a successful and intellectually stimulating seminar.

Prof. Amit Bhardwaj
Director, UP Higher Education, Prayagraj (U.P.)
Chief Patron, National Seminar on "Meri Mati Mera Desh"

From the Desk of Principal

The Meri Maati, Mera Desh campaign was launched on August 9, 2023, as the concluding event of India's Azadi Ka Amrit Mahotsav (Celebration of 75 years of Independence). This initiative is not just about honoring the soil of our land but also about rekindling a renewed commitment and pledge towards our villages, towns, cities, states, and national missions. Through various programs and events, we aim to inspire a deeper connection with our roots.This campaign is a tribute to the brave hearts of our nation—both past and present—who have contributed to India's growth and protection. It reminds us of those who came before us, celebrates those who serve today, and lays the foundation for a better future. At its core, Meri Maati, Mera Desh envisions a self-reliant and developed India, where we take pride in our rich heritage, strengthen national unity, and honor those who safeguard our country. To build a better nation, it is our collective responsibility to bring positive change. Transformation cannot be achieved through individual efforts alone; it requires a united commitment. This change must reflect across all fields—education, environment, social harmony, politics, economy, science, literature, and culture. Every aspect of our nation should embody the spirit of Meri Maati, Mera Desh. Our connection to our land is not just about geography; it is about our languages, traditions, customs, and the sacrifices of our ancestors. Their hard work and dedication should resonate through generations, inspiring the youth to dream of a prosperous and resilient India.

With love and dedication, we shall nurture our nation's future.With unity and self-reliance, we shall fulfill the dream of a strong and independent India!

Dr. Jagriti Madan Dhingra
Principal
Govt. Raza P.G. College, Rampur (U.P.)

From the Desk of Convenor

It is with immense pleasure that I welcome esteemed scholars, academicians, and researchers to our national seminar, "Meri Mati Mera Desh: Rashtriyata aur Vikas ki Sanyukt Gaatha . This gathering provides a vital platform to explore the interwoven tapestry of India's history, its evolving sense of nationalism, and its developmental journey from the watershed moment of the 1857 Revolt to the present day.“Our nation's narrative is one of extraordinary sacrifice, visionary leadership, and the unwavering resilience of its people. This seminar seeks to illuminate the historical, cultural, and socio-political forces that have shaped India's remarkable evolution. We will delve into the contributions of revolutionaries, reformers, and policymakers who, through their dedication and foresight, laid the groundwork for an independent, self-reliant, and progressive India.“A unique aspect of this seminar is the integration of perspectives on India's scientific heritage, tracing its roots to the profound wisdom of the Vedic period. By drawing upon references from the Vedas and Upanishads, we aim to showcase the nation's ancient yet sophisticated scientific thought, demonstrating its enduring relevance.“As Convenor, I express my sincere gratitude to all the contributors, distinguished guests, and participants whose commitment and intellectual engagement have made this important event possible. It is my hope that this seminar will spark vibrant discussions, inspire fresh avenues of research, and strengthen our shared commitment to India's glorious past and its bright future.

"I wish you all a stimulating and enriching experience."

Dr. Baby Tabassum
Convenor
National Seminar on 'Meri Mati Mera Desh'

"Meri Maati Mera Desh: A Combined Saga of Nationalism and Development". India is a land of rich traditions, deeply rooted in a glorious past that has evolved over thousands of years through Vedas, Puranas, Smritis, religious scriptures, folk traditions, and folk songs. These cultural and historical narratives have been passed down from generation to generation, forming the foundation of a strong and progressive civilization. This book aims to familiarize future generations with India's vibrant heritage, encapsulating the diverse aspects of human life that contribute to the making of a prosperous society and nation. Among these essential elements are nationalism, knowledge, science, education, an innate reverence for nature, water conservation, respect and equality for women, religious harmony, food and lifestyle traditions, and unique spiritual practices. These ideals resonate with the philosophy of "Sarve Bhavantu Sukhinah, Sarve Santu Niramayah, Sarve Bhadrani Pashyantu, Ma Kashchid Dukh Bhag Bhavet"—a vision that considers the entire world as one family and aspires for universal well-being. Despite India's vast diversity in religion, caste, language, and ideology, the concept of nationalism finds its essence in the term 'Hindu', often associated with Sanatan or Hindu culture. Rather than a religion, it is a way of life—embracing theistic and atheistic beliefs alike. The ethos of Hindu culture is reflected in the principles of Hindavi Swarajya envisioned by Chhatrapati Shivaji Maharaj, who promoted religious tolerance, deep respect for women (even among enemies), and ethical wartime conduct that safeguarded standing crops. Indian traditions also emphasize environmental conservation, with particular reverence for trees based on their utility. Planting Harishankari (Peepal, Pakar, and Banyan) and Triveni (Peepal, Banyan, and Neem) trees together is believed to be highly auspicious and beneficial. Ancient scriptures regard the construction of wells, ponds, and stepwells as acts of great

merit, reinforcing India's age-old wisdom on water conservation. Ayurveda and yoga, the jewels of Indian medical science, continue to serve as invaluable contributions to global well-being.The wealth of India's folk songs and oral traditions provides a remarkable lens through which cultural, social, and economic life is documented. These unwritten yet profoundly impactful traditions have been passed down for centuries. Songs sung during weddings, such as the haldi song—"Baba, how will I bear the burning turmeric? I am too delicate for its heat."—depict the significance of traditional rituals and the medicinal properties of turmeric and neem. Farewell songs—"Plant mango trees in the orchard, neem at the doorstep, and peepal by the pond, for they shall bear fruits, provide shade, and bring joy to future generations."—highlight the deep emotional connection with nature. Bhajans, Sohar (birth songs), and other folk compositions celebrate the birth of great personalities like Lord Ram, Krishna, and Ganesh, linking their greatness to the virtues instilled by their mothers—"Kausalya gave birth to Ram, Yashoda to Krishna, and Parvati to Ganesh. Their greatness is a testament to the virtues their mothers imbued in them." These songs emphasize the sacredness of motherhood, reinforcing the belief that a daughter's birth purifies a mother's womb. The concept of Ardhanarishwara—Shiva as half male and half female—beautifully symbolizes the intrinsic equality of men and women, affirming that both are complementary and incomplete without each other. India's vast knowledge system encompasses not only spiritual and moral values but also a profound respect for all religions. Its festivals uphold social harmony, while regional food habits and lifestyles reflect cultural diversity. The spiritual depth of Indian civilization has been so influential that luminaries like Annie Besant dedicated their lives to its study and propagation. Despite these profound strengths, India faced grave challenges, particularly following British colonial rule after 1757. The British deliberately attacked Indian traditions, ridiculing and dividing

the populace along lines of caste, religion, and language to sustain their rule. British official Lionel Smith's statement—"Education will eliminate communal and religious biases, which we have used to control the people and pit Hindus against Muslims. Once educated, they will realize their vast strength and unite."—exemplifies their divide-and-rule strategy. However, the resilience of India's soil prevailed. Rising above these imposed divisions, Indians united against imperialism and waged a long struggle for independence, delivering a resounding message of freedom to the world. Each chapter of this book echoes these unique cultural characteristics of India. We extend our heartfelt gratitude to the esteemed scholars and researchers whose invaluable contributions have enriched this compilation. We express our sincere appreciation to Professor Amit Bhardwaj (Director, Higher Education, Prayagraj, Uttar Pradesh), Professor Qayyum Hasan (Former Vice-Chancellor, Cluster University, Jammu & Kashmir), Professor Pushkar Mishra (Director, Raza Library, Rampur), Professor Jagriti Madan Dhingra (Principal, Government Raza Postgraduate College, Rampur), Dr. Baby Tabassum (Convenor) and Professor Asmar Baig (Department of Political Science, Aligarh Muslim University) for their significant suggestions, goodwill messages, and forward notes, which have greatly enhanced the substance of this book.""Our gratitude also extends to Mr. Akshay Gupta Ocean Publications, whose relentless efforts have brought this work to fruition. We firmly believe that "Meri Maati Mera Desh: Rashtriyata aur Vikas ki Sanyukt Gaatha" will fulfill its intended purpose and inspire readers to rediscover and cherish the invaluable heritage of India.

Dr. Mujahid Ali
Dr. V.K. Rai
Editors

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INDIA'S ECONOMY, NATIONALISM, AND NATIONAL INTEGRATION

Ravendra Kumar
Assistant Professor Mathematics, V R A L Govt Girls Degree College Bareilly, Email rkpmbly@gmail.com

ABSTRACT

In order to create homogeneous culture, nation building entails the process of national integration and merging the nationalities of many cultures and languages. From this perspective, the goal of national construction is to create a cohesive and participatory culture. The article describes the process by which individuals move their allegiance and dedication from tiny tribes and villages of petty princes to the bigger central political structure. The significance of unifying culture—defined as the sum of common values, norms, habits, and customs—is discussed in this article. To varied degrees, these elements provide unity and direction to a group.National development is the most important issue in each developing society. The issue of social integration also emerges in traditional societies once modernisation and political progress get underway. Early on following independence, the duties that the national

An authoritarian rule could have been justified because of the size of the government and the unsettling issues that resulted from India's partition. However, the Indian leadership made the decision to address each of these circumstances within a transparent and democratic framework. The state was initially established using rigorous integration techniques following successful attempts at national unification.

Keyword : independence, society, direction

INTRODUCTION :

The terms "nation" and "integration" combine to form the phrase "national integration." According to Karl Deutsch, "shared experiences" might serve as the foundation for the development of a feeling of shared nationality and community. Individuals who communicate with one another are mobilised on the basis of

common experiences and are further mobilised into a current of mobilisation that transforms the physical relationships between various groups into affective relationships. The activity of nation building involves the unification of nationalities of different languages and cultures in order to achieve homogeneous culture.

According to Almond and Powell, "It refers to the process whereby people transfer their commitment and loyality from smaller tribe, village of petty principalities to the larger central political 24 system," According to this perspective, the goal of national development is to establish a cohesive and participatory culture, of which the United Kingdom is the finest example. This has been dubbed "Unifying Culture" for good reason. Harold and Sprout define unifying culture thus : "By unifying culture we mean the aggregate of shared values, norms, habits and customs which give to member of a population a sense of belonging to a common community and which is varying degrees give unity, direction, 25 and purpose to the behaviour of the population."

Indians are different from other people. The divide that results from the rich getting richer and the poor getting poorer people to become one. Economic inequality: Regional differences have been brought about by an uneven pattern of socioeconomic growth. The designation of these states as BIMARU (Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh), etc., is the worst. There is animosity against the central leadership as a result of the states' classifications and subcategorisations based on socioeconomic metrics. The region's unequal economic development was one of the economic causes, since it resulted in disputes between the peoples and even the governments of the several states as well as between areas within states over issues like water distribution and project locations.

Integration in India :

Early on following independence, the duties prior to the the issues that arose during India's split were so upsetting and the national administration was so excellent that

There may have been justification for choosing to cooperate with an authoritarian regime. However, the Indian government made the decision to address each of these

circumstances within a transparent and democratic framework. The state was initially established by rigorous integration merger methods after successful national consolidation efforts. Nation building is the process of bringing together the nationalities of diverse cultures and languages in order to create a homogenous culture.

According to Almond and Powell, "It refers to the process whereby people transfer their commitment and loyality from smaller tribe, village of petty principalities to the larger central political 24 system," According to this perspective, the goal of national development is to establish a cohesive and participatory culture, of which the United Kingdom is the finest example. This has been dubbed "Unifying Culture" for good reason. Harold and Sprout define unifying culture thus : "By unifying culture we mean the aggregate of shared values, norms, habits and customs which give to member of a population a sense of belonging to a common community and which is varying degrees give unity, direction, 25 and purpose to the behaviour of the population."

Integration after Independence :

Following independence, "caste cleavages, nationality and linguistic differences which were lying dormant during the 33 pre-independence days, began to surface again." The integration of the nation was now the main job facing the leadership. The government and leadership took notice of certain regional movements that took the shape of communalism and language. Considerable efforts were made to integrate the nation. The National Integration Council was established in 1961. established in an effort to improve national unity and address integration issues. Masud, H.N. outlined the following formal definition of national integration: "Integration has come to be used officially for bringing about, with the consent of all concerned, a social and religious climate in the country wherein it may be possible for all citizens, irrespective of religious differences or social status to live a life of peace and tranquility devoted entirely to a common purpose of building up a strong, prosperous and forward looking society which can contribute its own share to the peace of the world." The idea of the National Integration Council places a heavy emphasis on the peaceful environment that allows all residents to create a more

robust, affluent, and united society.

Poverty remains a significant issue in spite of the implementation of five-year economic plans and several socioeconomic welfare initiatives. A sizable portion of the population stays well outside of the national mainstream. The development of the entire population and the entire country is referred to as economic development. To guarantee shared national prosperity, extra work is required in this area.

Religions :

Statistics on religion-based demographics Hindus make up 80.5%. Muslims make up 13.4%. 2.3% of people are Christians 3.8% Other (Report on the Census, 2001) Many people in India do not fit within the aforementioned group. Make a list of all of them.

As a result, India became an independent nation with a diverse population of castes, races, dialects, and faiths. How does India manage to be a united state in spite of this? Belonging to and identifying with a state is what is meant by nationalism. The unification of the people based on characteristics such as class, language, religion, and culture is known as nationalism. An ideological sentiment among individuals based on shared identities is called nationalism.

You now know that there are two types of nationalism: defensive nationalism and aggressive nationalism.

In imperialist countries, there was aggressive nationalism. Defensive nationalism was the genesis of Indian nationalism. The nationalism of India is distinct from that of other nations.

Religion, caste, regionalism, or race had little bearing on the development of Indian nationalism. It emerged as a consequence of the unusual conditions. of the 1800s. A number of things have led to it.

Linguistic asserts. It has been observed that the Indian constitution acknowledges 22 languages. The official language is Hindi, whereas the link language is English. About the year 2000

A Formula for Three Languages:

The three-language formula was proposed to encourage state-to-state communication and national integration. The idea was that the school curriculum in Hindi-speaking regions should incorporate Hindi, English, and any mother tongue. In regions where Hindi is not the primary language, Hindi and English

Difficulties with Indian National Integration :

A few things prevent our country from being fully integrated.

Regionalism :

A person who practices regionalism prioritises their local area over their country. Regionalism produces regional interests as opposed to national interests when it is connected to language and religion. People become more localised as a result of this.

The most pressing issue in any growing society is nation-building. The issue of social integration also emerges in traditional societies as modernisation and political development take hold. C.E. Black identifies a few key issues that all modernising societies must deal with.

The words "nation" and "integration" make up the phrase "national integration." According to Karl Deutsch, "shared experiences" might serve as the foundation for the development of a feeling of shared nationality and community. Communicating with one another mobilises people based on common experiences and further mobilises them into currents of mobilisation that transform the physical relationship between various groups into an emotive relationship. In order to create homogeneous culture, nation-building involves the process of national integration and merging the nationalities of diverse cultures and languages. According to Almond and Powell, "It refers to the process whereby people transfer their commitment and loyality from smaller tribe, village of petty principalities to the larger central political 24 system," From this perspective, the goal of national construction is to establish a cohesive and participatory culture, of which the UK is the best example. This has been dubbed "Unifying Culture" for good reason. Harold and Sprout define unifying culture thus :

"By unifying culture we mean the aggregate of shared values, norms, habits and customs which give to member of a population a sense of belonging to a common community and which is varying degrees give unity, direction, 25 and purpose to the behaviour of the population."

CONCLUSION :

The work of nation building involves the process of national Integration and unification of many cultural ethnicities and languages is done in an effort to create uniform culture. The article describes the procedure by which

From smaller tribes and villages of minor monarchies, individuals move their allegiance and dedication to the bigger central political structure," according to this perspective, the goal of national development is to establish a cohesive and participatory culture The significance of unifying culture—defined as the collection of commo values, conventions, habits, and rituals that provide members of a society with a sense of community and, to varied degrees, provide unity and direction—is highlighted in this article. The most pressing issue in any growing society is nation-building. The issue of social integration also emerges in traditional societies as modernisation and political development take hold. Income disparity is directly reduced when the wealthiest members of society pay higher taxes than the poorest. These taxes can further lessen inequality if they are used to fund public services. Tax systems can also be used to promote policies that lessen inequality and discourage policies that increase it, such as tax credits for companies that give their workers a larger portion of their profits.

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WOMEN FREEDOM FIGHTERS

Nisha Verma[1] and Rajeev Kumar Yadav[2]
[1]Department of Botany, V.R.A.L. Rajkiya Mahila Mahavidyalaya, Bareilly. [2]Department Of Botany, Bareilly College, Bareilly

ABSTRACT

The history of Indian struggle would be incomplete without mentioning the contributions of women. Women's participation in India's freedom struggle began as early as in 1817. The sacrifice made by the women of India will remain paramount, what the women of India have done is priceless. The Indian women broke away from various restrictions and got out of their traditional home-oriented roles and responsibilities. So, the participation of women in the freedom struggle and National awakening is simply incredible and praiseworthy. However, it is not easy for women to fight as warriors in the male dominating society. Even if women tried to change the perception of people so conservative who thought women are just there to do housework. The history of the Indian freedom struggle is full of stories of women's sacrifice, altruism and valor. Very few of us know that there were hundreds of women who fought side by side with their male counterparts. They fought with true spirit and indomitable courage. There is a wide list of such women who fought for freedom bravely. Starting with Sarojini Naidu, Vijayalakshmi Pandit, Kamaladevi Chattopadhyay, Bhikaiji Cama and Mridula Sarabhai at the national level, there are so many leaders at provincial level like Annie Mascarene and A.V. Kuttimaluamma in Kerala, Durgabai Deshmukh in Madras Presidency, Rameshwari Nehru and Bi Amman in U.P., Satyawati Devi and Subhadra Joshi in Delhi, Hansa Mehta and Usha Mehta in Bombay, Rani Gaidinliu from Manipur and several others.

Key words: Indian, Women, Freedom movement, Freedom Struggle.

The history of Indian struggle would be incomplete without mentioning the contributions of women. Women's participation in India's freedom struggle began as early as in 1817. The sacrifice made by the women of India will remain paramount, what the women of India have done is priceless. The Indian women broke

away from various restrictions and got out of their traditional home-oriented roles and responsibilities. So, the participation of women in the freedom struggle and National awakening is simply incredible and praiseworthy. However, it is not easy for women to fight as warriors in the male dominating society. Even if women tried to change the perception of people so conservative who thought women are just there to do housework. The history of the Indian freedom struggle is full of stories of women's sacrifice, altruism and valor. Very few of us know that there were hundreds of women who fought side by side with their male counterparts. They fought with true spirit and indomitable courage. Furthermore, women not only sacrifice their lives but also struggle with these issues. There is no doubt that women participated in the anti-British struggle in large numbers. There is a wide list of such women who fought for freedom bravely. Starting with Sarojini Naidu, Vijayalakshmi Pandit, Kamaladevi Chattopadhyay, Bhikaiji Cama and Mridula Sarabhai at the national level, there are so many leaders at provincial level like Annie Mascarene and A.V. Kuttimaluamma in Kerala, Durgabai Deshmukh in Madras Presidency, Rameshwari Nehru and Bi Amman in U.P., Satyawati Devi and Subhadra Joshi in Delhi, Hansa Mehta and Usha Mehta in Bombay, Rani Gaidinliu from Manipur and several others. It is a very difficult task to distinguish between regional level and all-India level leaders. Most of the women began at the local level and become the national leaders.

Besides all these Indian women, there were also international women like Annie Besant and Margaret Cousins, who brought their own knowledge of the Irish experience of British exploitation to help India. Aruna Asif Ali was widely recognised as the 'Grand Old Lady' of the Independence Movement and she played a leading role during the Quit Indian Movement. *Sarojini Naidu* emerged as a prominent nationalist around 1917. She actively participated in Salt Satyagraha, Quit India Movement". She traveled across India and gave lectures on female empowerment and nationalism. *Kamaladevi Chattopadhyay* also participated in the Salt Satyagraha. She promoted handicrafts, handloom and theatre. *Annie Basant* the first President of the Indian National Congress. Annie Basant also worked in theosophical society which was awaking the Indians to fight with British.

Vijayalakhsmi Pandit was jailed thrice for her nationalist activities in 1932, 1940 and 1942, participated in Salt Satyagraha. *Durgabai Deshmukh* was jailed for three years for participating in Salt Satyagraha. During the Satyagraha, when southern leaders like Rajaji and T. Prakasam were busy organizing other events of the movement, it was Durgabai who led a group of salt lawbreakers at Marina Beach in Madras. *Basanti Das* was an activist during the British rule in India. She took an active part in various political and social movements. *Sucheta Kriplani* in 1932, she entered pubic life as a social worker and in 1939. She entered in politics and joined the Indian National Congress. In 1940, she offered individual satyagraha at Faizabad and was imprisoned for two years. So, there are so many women freedom fighters who gave her whole life to India, out of them some women freedom fighters are listed below

Annie Besant (1847-1933) an Irish lady was an ardent supporter of Irish and Indian Home- Rule. After being influenced by Madame Blavatsky of the Theosophical Society, she embraced theosophy. Annie Besant joined the Indian National Congress. She was the first women president of congress and gave the powerful lead to women's movement in India. She also became involved in Indian nationalism in 1916 established the Indian Home rule league of which she became president. She started a newspaper "new India" criticized British rule and was jailed for sedition. She was released in September 1917, she was elected President of the Indian National Congress in December. Annie Besant played a significant role in education, including being a co-founder of Banaras Hindu University in 1913.She emphasized the importance of studying ancient Indian religions, philosophies and doctrines. Besant established the Central Hindu School and founded several institutions, including the Madras Parliament, Madanapalle College, Adyar Arts League, Bombay Home Rule League, Girls' College in Benares, Order of the Brothers of Service, Women's Indian Association at Adyar, and All-India Women's Conference in Poona in 1927.

Bhikaiji Cama (1861-1936), an eminent personality of the Indian nationalist movement, she was born as Bhikaji Rustomcama on 24thSeptember, 1861 to a Parsi family in Mumbai and actively participated in the Indian freedom movement and advocated

for Swaraj. Madam Bhikaji Cama was influenced by Dadabhai Naoroji and was a source of inspiration for Indian youth in the UK. In 1907, she made history by being the first person to hoist the Indian flag in Germany, which was designed by Cama and Vinayak Damodar Savarkar. Cama relocated to Paris, where she established the Paris Indian Society with co-founders Munchershah Burjorji Godrej and S.R. Rana. She also began the journal 'Bande Mataram' to spread her revolutionary thoughts. She travelled a lot and spoke to people about Indians Struggling for Independence. She could aptly be called "Mother India's first cultural representative of USA"

Sarojini Naidu (1879-1949) was recognized as the 'Nightingale of India' or 'Bharat Kokila' by Mahatma Gandhi. She actively participated in the Home Rule movement initiated by Annie Besant. Sarojini Naidu emerged as a key figure in leading the Civil Disobedience Movement and the Quit India Movement. She accompanied Mahatma Gandhi to London for the Second Round Table Conference in 1931, aiming to foster Indian-British cooperation. Instrumental in establishing the Women's India Association. In 1925, she was appointed as the President of the Indian National Congress. Later, in 1947, she became the Governor of the United Provinces, becoming the first woman to hold such a position in the Dominion of India. At a young age, she wrote the 1300 line poem, 'Lady of the Lake'. She gained international recognition for her Persian-language play, 'Maher Muneer'.After independence, she became the first ever woman Governor of an Indian State ,Uttar Pradesh.

Vijaya Lakshmi Pandit (1900-1990) was daughter of Motilal Nehru, were the president of congress and sister of Jawaharlal Nehru. In 1937, she won the elections to the United Provinces and became the first woman to hold a cabinet position as the minister. She also served as the President of the All-India Women's Conference from 1941 to 1943, advocating for gender rights and women's welfare. Participated in NCM, CDM and Quit India Movement. First woman to become the president of the United Nations General Assembly. She was a great fighter and took part in many of the freedom movement. She was arrested in 1932 and sentenced to one year's rigorous imprisonment. She was

arrested in 1940 and yet again during the quit India movement in 1942.

Kamala Kaul Nehru (1899-1936) is a colossal name in the group of women freedom fighters of our country. The noncooperation movement 1921, she organized groups of women in Allahabad and picketed shops selling foreign cloth and liquor. When her husband was arrested while delivering a "seditious" public speech, she went in his place to read it out. The British soon realized the threat that Kamala Nehru emerged as. Hence she was arrested on two occasions for involvement in independence struggle activities, along with Sarojini Naidu and other women in the Indian Freedom struggle.

Kamaladevi Chattopadhyay (1903-1988) was a freedom fighter and a social reformer. She returned to India from London in 1923 and joined Seva Dal. She was elected President of the Youth Congress in December 1929 and appealed to the National Congress leaders to declare Poorna Swaraj as their goal. On January 26, 1930, Kamaladevi captured the imagination of the entire nation when in a scuffle, she clung to the Tricolor in order to protect it. Blows rained on her as she stood like a rock to protect the flag, bleeding profusely. She had a close association with Margaret Cousins, the founder of the All India Women's Conference. During Gandhi's salt satyagraha, she was arrested for attempting to sell contraband salt at the Bombay Stock Exchange. She cofounded the Congress Socialist Party with Jayaprakash Narayan and Ram Manohar Lohia in 1936 and in 1937, became its President. Kamaladevi actively advocated for the passage of the Child Marriage Restraint Bill and the Age of Consent Bill in the Central Assembly. She also championed women's rights in both domestic and professional spheres and supported the Uniform Civil Code.

Sucheta Kriplani (1908-1974) was an ardent nationalist with socialistic orientation. She founded the All India Mahila Congress in 1940, advocating for women's rights and empowerment. She worked closely with Mahatma Gandhi during the tumultuous time of the Partition riots, accompanying him to Noakhali in 1946. She was a close associate of Jai Prakash Narayany who actively participated in Quit India Movement. This St Stephen's educated politician sang Vande Mataram in the

independence session of the Constituent Assembly on August 15, 1947. She was selected as one of the 15 women to participate in drafting the Indian Constitution as a member of the Constituent Assembly. She was a member of Constituent Assembly in 1946. She was general secretary of Indian National Congress from 1958 to 1960, and Chief Minister of Uttar Pradesh from 1963 to 1967. She was first woman Chief Minister of Uttar Pradesh.

Aruna Asif Ali (1909-1996) was widely recognized as the 'Grand Old Lady' of the Independence Movement. Aruna Asaf Ali played a leading role during the Quit Indian Movement. Her moment of reckoning came in 1942 during the Quit India Movement and she rose to occasion. She unfurled the National Flag at the Gowalia Tank maidan in Bombay to signify the commencement of the Quit India Movement and became a legend for thousands of youths that rose to emulate her. She became a full-time activist in the Quit India Movement and went underground to evade arrest. Aruna was an active member of the congress party. She had participated in public marches during the salt satyagrah. She edited 'Inquilab' a monthly journal of the Indian National Congress. She was awarded India's highest civilian award, the Bharat Ratna.

Kalpana Dutt (1913-1995) was another prominent woman revolutionary leader. She was influenced by the revolutionary idea of Surya Sen and participated in the Chittagong Armoury Loot in 1930. She was inspired by the martyrdom of Khudiram Bose and joined Chattri Sangha, a semi-revolutionary organization for women in Kolkata.

Rani Gaidinliu (1915-1993) was a freedom fighter who belonged to the Rongmei tribe, also known as Kabui and was a spiritual and political leader among the Nagas. She was a prominent Naga nationalist woman leader from Manipur who took over the movement of Naga nationalists against the British. Her movement was active during the Civil Disobedience Movement to oust the foreigners from Manipur. At the age of 13, she joined the Heraka movement alongside her cousin Haipou Jadonang. The movement aimed to revive the Naga tribal religion and establish self-rule for the Nagas, thereby ending British rule. For her remarkable patriotism, she received praise from the nationalist leaders. She

was arrested in 1932 and released after Indian Independence. "Rani of the Nagas" the popular title was bestowed upon her by Jawaharlal Nehru for her influence and work for the Nagas.

Usha Mehta (1920-2000) who as child participated in the "Simon go back" movement. At the age of eight in 1928, She participated in a protest march against the Simon Commission. On 14 August 1942, She and her associates established the Secret Congress Radio, a covert radio station that went on air on 27 August. The radio broadcast recorded messages from Gandhi and other prominent leaders across India. To guide the authorities, the organizers moved the station's location almost daily. It played a crucial role in keeping the freedom movement leaders connected with the public. The Secret Congress Radio broadcasted significant events such as the Chittagong Bomb Raid, the Jamshedpur strike, and the functioning of parallel governments in Bihar and Maharashtra. however, the police found them on 12 November 1942 and arrested the organizers, including Usha Mehta. All were later imprisoned

After so many efforts, India gained independence on August 15, 1947. Thousands of Indian women dedicated their lives to achieving independence for their country. India achieved Independence because of Sathyagrahas, sacrifices, a century of revolutions, struggle, blood shedding by freedom fighters. The women shouldered critical responsibilities in India's struggle for freedom. Women freedom fighters bravely faced the baton of the police and went behind the iron bars. Hundreds and thousands of Indian women dedicated their lives for obtaining freedom of their motherland.

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MODERN INDIA:1991-2024

Dr. Rekha Kumari[1]
[1]Govt. Raza Postgraduate College, Rampur (U.P.)

ABSTRACT:

Modern India has undergone significant transformations in recent decades, driven largely by economic liberalization and rapid technological advancements. The country's integration into the global economy, accompanied by domestic policy shifts, has reshaped various sectors, fostering growth in industries ranging from information technology to manufacturing. Central to this transformation is the Digital India initiative, which aims to enhance digital infrastructure, promote digital literacy, and ensure the availability of e-governance services to all citizens. This initiative has been pivotal in enabling greater access to information and services, facilitating business growth, and improving governance. As a result, India stands at the forefront of the digital revolution, with promising opportunities for continued development in the 21st century.

INTRODUCTION:

India's Transformation Since 1991

India's economic and technological landscape has undergone a profound transformation since 1991, marking a period of significant change that has reshaped the country into one of the world's fastest-growing economies. The pivotal moment in this transformation came with the economic liberalization of 1991, which laid the foundation for the country's current growth trajectory. The liberalization, coupled with advancements in technology, has brought India to the forefront of the global economic and technological arena [1]. Prior to 1991, India's economy was characterized by protectionist policies, state-controlled industries, and limited foreign investment. The nation was largely insulated from global markets, and growth was slow and constrained by bureaucratic inefficiencies. However, the economic reforms initiated in 1991 under then-Finance Minister

Dr. Manmohan Singh, spurred by a balance of payments crisis, marked the beginning of a new era[2]. Key reforms included:

1. **Foreign Direct Investment (FDI)**: The opening up of the economy allowed India to attract foreign investment, which has been crucial in driving infrastructure development, creating jobs, and advancing technology. Sectors like telecommunications, automobiles, and energy saw significant foreign inflows.

2. **Global Integration**: Economic liberalization positioned India as a key player in global trade and finance. It increased India's exports, attracted multinational companies to set up operations in the country, and integrated the Indian economy with global supply chains [5].

Role of the Digital India Initiative in Redefining the Nation

The **Digital India initiative**, launched in 2015, has played a central role in further accelerating India's transformation into a digitally empowered society. The initiative aims to bridge the digital divide, make government services more accessible, and enhance citizen engagement through technology. Some key aspects of Digital India include:

1. **Digital Infrastructure**: The Digital India program has focused on expanding internet access across the country, including rural and remote areas, by building broadband networks, improving telecom infrastructure, and supporting initiatives like *BharatNet* to connect rural India. This has enabled millions of people to access information, services, and opportunities that were previously out of reach.

2. **E-Governance and Public Services**: The initiative has digitized government services, making them more efficient and transparent. Projects like *Aadhaar* (the world's largest biometric identity system), *PMGDISHA* (Pradhan Mantri Gramin Digital Saksharta Abhiyan), and *e-Districts* have streamlined government operations, reduced corruption, and improved delivery of welfare schemes[6].

3. **Digital Literacy and Skill Development**: By fostering digital literacy programs, the Digital India initiative aims to make every citizen digitally empowered, ensuring that they are equipped to navigate an increasingly digital world. The government has partnered with educational institutions, NGOs, and private sector organizations to provide digital training across the country.

4. **Digital Financial Inclusion**: With the advent of mobile banking and digital payment systems, Digital India has played a crucial role in fostering financial inclusion. Initiatives like *Jan Dhan Yojana* (financial inclusion), *UPI* (Unified Payments Interface), and *Aadhaar-linked payments* have made banking services more accessible to millions, especially in rural areas.

5. **Boosting Innovation and Startups**: Digital India has also contributed to the growth of India's startup ecosystem, fostering innovation in sectors such as fintech, healthtech, edtech, and agritech. The ease of access to digital platforms and funding, combined with a growing culture of entrepreneurship, has created a vibrant startup ecosystem, with India now home to one of the largest number of unicorns globally[6].

India's journey since 1991 reflects the nation's adaptability and vision for growth in a globalized world. Economic liberalization unlocked the doors to opportunities, and technological growth has been instrumental in propelling India forward. The Digital India initiative, in particular, has redefined the nation, enabling citizens to access digital services, bridging the gap between urban and rural areas, and positioning India as a leader in the global digital economy. As India moves toward its goal of becoming a developed nation by 2047, technology will continue to play a critical role in shaping its future[6].

The 1991 Economic Liberalization: A Catalyst for Technological Growth

The 1991 economic liberalization in India marked a pivotal moment in the country's history, transforming its economy from one that was highly controlled and inward-looking to a more open,

market-driven, and globally integrated economy. This set the stage for rapid technological growth and innovation, positioning India as a global hub for technology and services [7].

These measures collectively laid the foundation for India's economic growth and its integration into the global economy [8].

Impact on Technology-Driven Industries

The 1991 economic reforms had a profound impact on technology-driven industries, particularly in the fields of information technology (IT), telecommunications, and software services. Some of the key ways in which the reforms accelerated technological growth include:

1. **Growth of the IT Industry**: The economic liberalization created the conditions for the rapid growth of India's IT and software industries. India had a large, well-educated, English-speaking workforce, and the liberalization policies allowed IT companies to expand their global reach. With the liberalization of telecom services and the expansion of internet infrastructure in the late 1990s, Indian companies like Infosys, Wipro, and TCS grew rapidly and began providing software services to global clients.
    - **Outsourcing Boom**: The availability of a skilled and cost-effective workforce in India fueled the growth of business process outsourcing (BPO) and IT outsourcing. By the late 1990s and early 2000s, India had become a global outsourcing hub, providing services like call centers, software development, and IT consulting to companies worldwide.
2. **Telecommunications Revolution**: The 1991 reforms also played a crucial role in the liberalization and privatization of the telecommunications sector. The opening up of the market to private players and foreign investments spurred the rapid expansion of mobile and internet services across India. This laid the groundwork for the country's mobile phone revolution in the 2000s, making India one of the largest mobile phone

markets in the world [9].

3. **Software and Tech Startups**: The reform period also saw a boom in software startups, as the opening up of the economy provided opportunities for innovation and entrepreneurship. India began to emerge as a hub for tech startups, with Bengaluru, Hyderabad, and Pune becoming leading centers for technology and innovation. Over the years, India produced numerous technology giants, such as Flipkart, Ola, and Zomato, that became global success stories.

4. **Digital Infrastructure Development**: As foreign companies invested in India and Indian companies expanded, there was an increased demand for technological infrastructure, such as data centers, high-speed internet, and cloud computing. This helped fuel the development of India's digital infrastructure, which has supported the growth of e-commerce, fintech, edtech, and other digital services.

5. **Advancements in Research and Development**: The liberalization policies allowed India's private sector to collaborate with global companies and access advanced technologies. This fostered innovation and research in key areas such as biotechnology, pharmaceuticals, and information technology. Over time, Indian companies became involved in developing and patenting cutting-edge technologies [10].

Role of Globalization and Foreign Investments

Technology Transfer: As foreign companies entered India, they brought with them new technologies, management practices, and best practices in various industries. This facilitated the transfer of advanced technology and expertise to Indian firms, which, in turn, enhanced their competitive edge and technological capabilities [11].

The 1991 economic liberalization was a critical turning point for India, serving as a catalyst for its technological growth and development. The reforms opened up the economy, encouraged foreign investment, and spurred the rise of technology-driven industries like IT and telecommunications. As a result, India

transformed into a global player in technology services and innovation. The integration of India into the global economy, aided by the inflow of capital, technology, and expertise, set the stage for the country to become a powerhouse in the digital age, with technology at the core of its future growth[11].

Technological Advancements in India (1991–2024)

- **Evolution of the IT sector and its global impact**: Since 1991, India's IT sector has evolved from a nascent industry to a global leader in software services and solutions. Companies like TCS, Infosys, and Wipro emerged as major players in IT outsourcing, significantly impacting global business operations. This growth has not only contributed to India's GDP but also positioned the country as a key supplier of technology talent worldwide.
- **Growth of telecom and the Internet revolution**: The deregulation of the telecom sector in the early 1990s paved the way for rapid growth and competition. Companies like Bharti Airtel and Reliance Jio transformed the telecom landscape and made mobile services accessible to millions. The advent of affordable smartphones and data plans spurred the Internet revolution, leading to increased digital connectivity and online services, including e-commerce, social media, and information access.
- **Innovations in space technology: ISRO's achievements**: The Indian Space Research Organisation (ISRO) has made significant strides in space technology, achieving notable milestones such as the successful Mars Orbiter Mission (Mangalyaan) and the Chandrayaan missions to the Moon. These achievements not only demonstrate India's growing capabilities in space exploration but also highlight its position as a cost-effective player in satellite launches globally.
- **Advancements in healthcare and biotechnology**: India has made substantial advancements in healthcare and biotechnology, including the development of affordable vaccines, generic medicines, and innovative medical technologies. The growth of telemedicine and digital health

platforms has further expanded access to healthcare services, particularly in rural areas, improving health outcomes and making healthcare more accessible.

Together, these advancements illustrate India's remarkable progress in technology across various sectors, significantly influencing both domestic and global landscapes between 1991 and 2024 [12].

1. E-Governance Initiatives

The *Digital India* program has led to the creation of various e-governance initiatives that have streamlined government services, increased transparency, and empowered citizens.

- **Aadhaar**: Perhaps the most revolutionary initiative under *Digital India*, *Aadhaar* is the world's largest biometric identification system, aimed at providing a unique identity to every Indian citizen. It is used for availing government subsidies, opening bank accounts, and for verifying identities in multiple sectors. With over 1.3 billion people enrolled, *Aadhaar* has become a critical tool for inclusion in India's digital economy.
- **DigiLocker**: DigiLocker is a cloud-based platform that allows Indian citizens to securely store and share their documents, such as academic records, certificates, and government-issued IDs. It eliminates the need for physical paperwork, making it easier for citizens to access their documents online while ensuring the integrity of these records.
- **eSign**: The eSign framework enables digital signing of documents, ensuring the authenticity of transactions and reducing the need for physical signatures. It facilitates easier and faster online processes for individuals and businesses alike.
- **e-Government Services**: Platforms such as *e-District*, *National Portal of India*, and *Online Public Grievance Redressal System* have made public services more accessible, reducing the complexity and time required for citizens to avail them. These initiatives enable citizens to apply for certificates,

licenses, and permits, track the status of their applications, and lodge grievances—all online.

- **PMGDISHA (Pradhan Mantri Gramin Digital Saksharta Abhiyan)**: This initiative aims to digitally empower rural India by providing digital literacy to citizens, especially in rural and underserved areas. It is expected to reach over 6 crore people across the country [14].

2. Enhancing Rural Connectivity and Bridging the Digital Divide

One of the central goals of *Digital India* is to reduce the digital divide between urban and rural India. The rural-urban divide has long been a challenge in terms of access to technology, government services, and opportunities for economic growth. Several steps have been taken under *Digital India* to address these disparities:

- **BharatNet**: BharatNet is one of the largest rural broadband projects in the world, aimed at providing high-speed internet connectivity to all 250,000 gram panchayats (village councils) across India. By 2023, this initiative had reached over 160,000 gram panchayats, bringing broadband connectivity to remote rural areas and enabling the delivery of e-services.
- **Common Service Centers (CSCs)**: CSCs are digital kiosks that serve as access points for government services, e-commerce, education, and health services in rural areas. These centers are powered by local entrepreneurs and offer services like issuing birth certificates, providing educational content, and facilitating access to financial services.
- **Wi-Fi Hotspots**: The government has partnered with private companies to create free Wi-Fi hotspots in rural areas. Initiatives like *PMWi-Fi* aim to make the internet accessible to rural populations by setting up community-based Wi-Fi systems.
- **Mobile Internet Penetration**: Through initiatives like the *BharatNet* and *PMWANI* (Public Wi-Fi Access Network

Interface), rural areas are being equipped with mobile network coverage and high-speed internet. This allows people in remote areas to access e-learning platforms, government services, and digital banking.

- **Skill Development Programs**: Through programs like *Digital Literacy Mission* and *Skill India*, the government has sought to enhance the digital skills of the rural population. These initiatives train individuals in basic computer operations, online communication, and internet navigation, empowering them to make the most of digital technologies [15].

3. Challenges and Future Directions

While *Digital India* has brought significant progress, it has also faced challenges, particularly in rural areas. These challenges include limited access to electricity, low internet penetration in remote regions, and low digital literacy rates. However, ongoing initiatives like improving infrastructure, increasing mobile internet penetration, and expanding digital education are addressing these issues.

The future directions of *Digital India* will likely include:

Startup Ecosystem

- **Tech-driven Startups**: Startups are emerging rapidly in the fields of AI, IoT, blockchain, fintech, healthtech, and edtech. These companies are offering innovative solutions to real-world problems, whether it's developing autonomous vehicles, creating digital health solutions, or designing platforms for decentralized finance (DeFi).
- **Venture Capital and Funding**: The rise of venture capital (VC) funding and private equity investments has fueled the growth of startups. Investors are particularly keen on tech-driven startups, as they promise high scalability and global reach.
- **Accelerators and Incubators**: Programs like Y Combinator, Techstars, and government-backed initiatives like *Startup India*

are providing funding, mentorship, and resources to nurture young companies. These accelerators are essential in helping startups transition from the ideation phase to scale-up.

- **Global Collaboration**: The digital era has made it easier for startups to reach global markets. Cloud technologies, digital marketing, and e-commerce platforms enable entrepreneurs to sell their products and services worldwide without the need for physical stores or offices.
- **Disruption of Traditional Industries**: Startups are increasingly disrupting traditional sectors such as finance (with fintech), education (with edtech), transportation (with ride-sharing and autonomous vehicles), and healthcare.
- **Manufacturing**: The low latency of 5G allows real-time communication between machines in industrial environments, enabling faster production cycles, predictive maintenance, and smart factory operations [21].
- **Privacy and Security**: With the increase in connected devices and data exchange, concerns about privacy and cybersecurity will become more pronounced. Ensuring robust security protocols and data protection will be vital [22]

The digital era is defined by the rapid adoption of transformative technologies such as AI, IoT, and Blockchain, which are reshaping industries and daily life. The rise of startups and the entrepreneurial ecosystem has further fueled innovation, while the transition to 5G promises to unlock new possibilities across sectors. However, the impact of these technologies on society will depend on how they are implemented, regulated, and integrated into daily life. As we move forward, it is crucial to ensure that the benefits of these technologies are equitably distributed and that challenges related to privacy, security, and access are addressed [23].

Key Issues:

- **Limited Internet Connectivity**: Rural areas often lack the high-speed broadband infrastructure that is available in urban centers. Despite government initiatives such as **BharatNet** in

India and other rural connectivity programs, many remote areas still struggle with poor internet quality, slow speeds, and intermittent access. This limits their ability to participate in online education, telemedicine, e-commerce, and other digital services.

- **Access to Devices**: Even when internet infrastructure is in place, many individuals in rural areas cannot afford digital devices (smartphones, laptops, etc.) or the data plans required to connect. This adds to the inequality in access to educational resources, government services, and job opportunities that are increasingly digitized.
- **Digital Literacy**: A lack of digital literacy exacerbates the divide. Rural populations, especially older generations and those with lower educational levels, may lack the skills to effectively use the internet, smartphones, and other digital tools. This prevents them from taking advantage of the benefits of e-governance, online banking, and other services.
- **Opportunity Disparities**: The urban-rural digital divide creates significant gaps in educational and economic opportunities. Urban areas often have better access to online learning platforms, higher-quality healthcare through telemedicine, and greater exposure to digital jobs. Rural populations are at risk of being left behind, widening socioeconomic inequality [25].

While emerging technologies are transforming the digital landscape, significant challenges remain in the areas of the **digital divide**, **cybersecurity and data privacy**, and **infrastructure and policy gaps**. Addressing these issues is crucial to ensuring that digital transformation is inclusive, secure, and sustainable. Governments, businesses, and civil society must collaborate to bridge these gaps and create a digital ecosystem that benefits all individuals, irrespective of their geographic location, socioeconomic status, or technical expertise. By doing so, we can unlock the full potential of the digital era while safeguarding the rights and well-being of all citizens [30].

- **Space Technology**: India's space agency, **ISRO (Indian Space Research Organisation)**, is internationally recognized for its cost-effective and successful space missions. The **Mangalyaan (Mars Orbiter Mission)** in 2013 made India the first Asian country to reach Mars orbit and the fourth space agency globally to do so. India's advancements in satellite technology and space exploration have positioned the country as a key player in the global space race [33].

2. Technological Diplomacy and International Collaborations

India's role in **technological diplomacy** has evolved significantly in recent years. As global technology becomes increasingly important in the geopolitical and economic landscape, India has actively engaged with countries and international organizations to foster collaborations, drive technology development, and influence global tech policies.

Future Prospects: 2025 and Beyond

India, as it looks toward 2047 and its vision of becoming a global economic powerhouse, faces the challenge of aligning technological advancements with its national goals. The role of technology, especially AI, quantum computing, and renewable technologies, will be central in driving India's growth trajectory. This vision can be achieved through a combination of innovation, policy frameworks, and investment in human capital.

Role of Technology in Achieving India's 2047 Goals

India's goals for 2047 are ambitious: transforming into a developed nation with sustainable growth, technological leadership, and social equity. Technology will be the cornerstone of this transformation.

1. **Economic Growth**: Technology will boost productivity and efficiency across sectors, from manufacturing to services, driving higher GDP growth. AI, automation, and smart manufacturing will revolutionize industries and create high-value jobs.

2. **Education and Healthcare**: Technology will make education more accessible through online platforms, AI-driven tutoring, and virtual classrooms. Healthcare will benefit from telemedicine, AI diagnostics, and data analytics, allowing for improved access and quality across the country.

3. **Sustainability**: Technologies such as renewable energy and smart grids will enable India to meet its carbon neutrality goals. AI and data analytics can optimize resource management, ensuring that urbanization is sustainable and that rural areas benefit from technological solutions.

4. **Governance and Public Services**: Technology will improve governance, reducing corruption and increasing transparency. Digital platforms for public services, AI-powered decision-making, and blockchain for secure record-keeping can make government systems more efficient [36].

Predictions for AI, Quantum Computing, and Renewable Technologies

Artificial Intelligence (AI)

- **2025 Outlook**: India is expected to continue building AI expertise, particularly in sectors like agriculture, healthcare, and education. AI-based solutions will be tailored to address India-specific challenges, such as optimizing crop yields, diagnosing diseases, and creating personalized learning experiences.

- **2047 Vision**: By 2047, India could become a global hub for AI research and development, driving innovations in autonomous systems, natural language processing, and AI ethics. AI will play a significant role in governance and public policy, creating data-driven governance systems and reducing inefficiencies [37].

Policy Recommendations for Sustained Growth

1. **Investment in Research and Development (R&D)**: For India to remain competitive, the government should significantly

increase investment in R&D, particularly in emerging technologies like AI, quantum computing, and renewable energy. Public-private partnerships can play a key role in accelerating this.

2. **AI and Data Governance Framework**: As AI becomes integral to governance, privacy, and data protection laws should be strengthened. Ethical guidelines for AI usage, data ownership, and protection will be essential to ensure that these technologies are used responsibly.

3. **Infrastructure Development**: India should focus on building digital infrastructure, such as high-speed internet connectivity, data centers, and reliable power grids. In addition, a shift towards green and smart infrastructure will support the growth of smart cities and sustainable urbanization.

4. **Encourage Global Collaboration**: India should strengthen its position as a global leader in technology by fostering international collaborations in areas like AI research, quantum computing, and climate technologies. By engaging with global innovators, India can not only access cutting-edge technologies but also help shape international standards.

5. **Inclusive Growth**: Technology should not exacerbate inequality. Policies should focus on bridging the digital divide and ensuring that rural and underserved populations can access the benefits of technological advancements. Digital literacy programs and affordable access to the internet will be crucial for ensuring inclusive growth [38].

CONCLUSION

India's vision for a digitally empowered future is grounded in its significant achievements and ongoing challenges in leveraging technology for socio-economic development. Over the past decade, initiatives like Digital India have revolutionized public services, fostering digital literacy, financial inclusion, and widespread access to online education and healthcare. The nation has emerged as a global IT leader, bolstered by a thriving startup ecosystem and

advancements in renewable energy and smart urban infrastructure. However, challenges such as the digital divide, data privacy concerns, workforce upskilling, and infrastructure deficits persist. Looking ahead, India envisions universal digital access, sustainable growth through green technologies, and global leadership in innovation by 2047. Emphasis will be placed on advancing AI, automation, and data governance, transforming public services, and preparing a digitally skilled workforce. By addressing these challenges inclusively and sustainably, India aims to achieve economic prosperity, social equity, and global leadership in its centenary year of independence.

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ROLE AND IMPORTANCE OF EDUCATION IN CONSERVATION OF CULTURAL HERITAGE

Manik Rastogi[1] and Arvind Kumar[2]
[1]Research Scholar/Assistant Professor, [2]Assistant Professor, Department of Teacher Education (B.Ed.), Govt. Raza P.G. College, Rampur.

One of the world's oldest civilizations, India boasts a rich cultural legacy and a diverse range of customs. Since independence, it has made overall socioeconomic improvement. With the sea and mountains separating it from the rest of Asia, India, the seventh largest country in the world, has a unique geographical identity. Stretching southward from the Great Himalayas in the north, it tapers off into the Indian Ocean between the Arabian Sea on the west and the Bay of Bengal on the east at the Tropic of Cancer.

Every element or value of culture that has been passed down from one generation to the next by ancestors to humans is referred to as cultural heritage. They take pride in the fact that they are loved, safeguarded, and upheld by them in an uninterrupted manner. The idea of heritage might be better understood with a few examples. Important sites of our heritage should be preserved at all costs, including the Taj Mahal, the Jain caves at Khandagiri and Udayagiri, Bhubaneswar, Sun Temple Konarak, Jagannath Temple, Puri, Lingaraja Temple, Red Fort of Agra, Delhi's Qutub Minar, Mysore Palace, Jain Temple of Dilwara (Rajasthan), Nizamuddin Aulia's Dargah, Golden Temple of Amritsar, Gurudwara Sisganj of Delhi, Sanchi Stupa, the Christian Church in Goa, India Gate, and others. In addition to architectural designs, monuments, and tangible artefacts, heritage also includes philosophical works, intellectual accomplishments, information treasures, and scientific discoveries and innovations. Significant gems of Indian cultural heritage include the contributions of Baudhayana, Aryabhatta, and Bhaskaracharya in the fields of mathematics, astronomy, and astrology; Varahmihir in physics; Nagarjuna in chemistry; Susruta and Charak in medicine; and Patanjali in yoga.

In order to preserve cultural history and the diverse fabric of human experience, education is essential. Education may guarantee that future generations will continue to recognize and enjoy the various customs and practices that contribute to the vibrancy of our country by promoting cultural knowledge and understanding. Education plays a crucial role in preserving Indian values and transmitting cultural heritage through various means:

1. **Preserving Traditional Knowledge:** By passing on traditional knowledge and customs to the next generation, education plays a critical role in preserving them. Through education, people can learn more about their cultural history, including their beliefs and customs. This helps to preserve cultural traditions and practices by passing on knowledge from one generation to the next.

2. **Encourages Cultural Diversity:** By introducing young children to a variety of cultures, traditional values, and ideas, education encourages cultural diversity. Learning about different cultures makes people appreciate diversity and emphasizes how important it is to preserve cultural heritage.

3. **Protects Art and Preserve Cultural Heritage:** Education is essential to the conservation of cultural sites and artifacts because it informs people about their historical and cultural significance, which in turn inspires them to protect these works of art, ensuring their survival for future generations. Education can be used to encourage cultural tourism, which benefits the local population monetarily while also protecting cultural heritage. Education helps people appreciate the value of cultural tourism and how it benefits local communities, supports local economies, and contributes to cultural heritage protection.

4. **Protection of Intangible cultural Heritage:** Values such as "Vasudhaiva Kutumbakam" (the world is one family), "Atithi Devo Bhava" (the guest is God), and "Sarve Bhavantu Sukhinah" (may all beings be joyful) are ingrained in India's rich cultural legacy, which spans thousands of years. In the twenty-first century, these values are transmitted from one

generation to the next and are still deeply embedded in cultures because of education. The protection of intangible cultural heritage revolves around the creative process of intergenerational transmission. Intangible cultural heritage is continuously recreated through this dynamic, interactive process. It is a type of informal education that has existed in communities for a long time and still does. As a result, it can offer pedagogy and material tailored to a given context for educational programs, so serving as a tool to increase the relevance of instruction and learning objectives.

Education programs can reinforce transmission modes and tactics that are acknowledged by communities. In this sense, educational establishments can promote reverence for intangible cultural heritage and offer fresh venues to guarantee its perpetuation for upcoming generations. Intangible cultural heritage can be taught to pupils through educational programs. The introduction of intangible cultural heritage as the subject of instruction is the main goal of living heritage education. Thus, the lesson's focus is on intangible cultural heritage itself, teaching pupils to value and consider both their own and other people's live traditions. In order to accomplish other learning objectives, educational programs can also teach pupils about intangible cultural heritage. The emphasis is on the educational potential provided by incorporating living cultural heritage into the teaching and learning process of the topics taught in schools, including history, math, biology, and music. It can increase the learning material's relevance and significance for the learners, because it ties in with their worldviews, knowledge systems and imagination. Thus, intangible cultural heritage offers a wide range of learning content and methods for teachers to draw on. The teachers are required to transmit to students that part of our cultural heritage which is pertinent to the present.

In order to ensure that the various customs and practices of our country continue to enhance our lives, education is a crucial instrument for protecting cultural heritage. We may contribute to the preservation of the priceless cultural assets that characterize our common human experience by funding educational programs that foster cultural awareness and appreciation.

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EMPOWERING PERSONS WITH INTELLECTUAL DISABILITIES: ENHANCING ACCESSIBILITY FOR EMPLOYMENT AS A PATHWAY TO INCLUSIVE GROWTH AND NATION-BUILDING IN INDIA BY 2047

Nidhi Khurana[1] and Ram Shanker Saxena[2]
[1]Student Int. B. Ed. M. Ed. Special Education, [2]Associate Professor, Amity Institute of Rehabilitation Science, Amity University Uttar Pradesh, Noida, U. P., email: khurananidhi9999@gmail.com

ABSTRACT

India's Vision 2047 aims to transform the nation into a developed economy by its 100th year of independence, with a focus on social inclusion, economic growth, and technological advancements. Promoting employment opportunities for Persons with Intellectual Disabilities (PWIDs) is a crucial element in realizing this vision, facilitating equal participation and opportunity for all citizens in the country's advancement. The study aims to explore the factors influencing employment accessibility for Persons with Intellectual Disabilities (PWIDs). This study conducts a narrative review of existing literature, focusing on research and articles from the last 10 years. The paper identifies critical challenges such as stigma, lack of vocational training, and insufficient workplace accommodations. The findings suggest that enhancing vocational skills, providing family support, and fostering inclusive workplace practices are essential to overcome these barriers and promoting accessibility to employment for Persons with Intellectual Disabilities. The study concludes that empowering Persons with Intellectual Disabilities with better employment opportunities is essential for fostering an inclusive society and achieving Vision 2047. Recommendations include developing targeted training programs, enhancing support systems for families, and improving workplace accessibility to ensure inclusive and sustainable employment for Persons with Intellectual Disabilities.

Key words: Vision 2047, Inclusion, Employment, Accessibility, Persons with Intellectual Disabilities (PWIDs).

INTRODUCTION:

Viksit Bharat - Vision 2047

During the launch of the Viksit Bharat @2047: Voice of Youth Program, Prime Minister Narendra Modi Ji emphasized ,

"Today, every institution and every individual should move with a resolution that every effort and act will be for Viksit Bharat. The aim of your goals, your resolutions should be only one – Developed India"

Viksit Bharat, or Developed India, is Prime Minister Narendra Modi's vision and a comprehensive framework for the country's growth, going beyond just a slogan. The "Viksit Bharat 2047" plan aims to transform India into a developed nation by 2047, marking the centenary of independence. This vision will guide the nation during the Amrit Kaal. Prime Minister Modi seeks to elevate India's global position through social reforms, technological advancements, and economic changes. The plan encompasses several key aspects, including economic development, inclusive growth, and innovation. A central goal of Viksit Bharat is to enable every citizen to actively engage in the nation's economic progress. PM Modi envisions a dynamic and inclusive economy with abundant opportunities for employment and entrepreneurship (PM Launches 'Viksit Bharat @2047: Voice of Youth,' 2023).

To achieve a self-reliant India, the government, under the leadership of Prime Minister Shri Narendra Modi, is dedicated to the values of

"Sabka Saath, Sabka Vikas, Sabka Vishwas, Sabka Prayaas."

According to RPWD ACT 2016 , Intellectual Disability is defined as,

"*Intellectual disability, a condition characterised by significant limitation both in intellectual functioning (reasoning, learning, problem solving) and in adaptive behaviour which covers a range of every day, social and practical skills*"

Persons with Intellectual Disabilities in India need various

supports to live fulfilling lives, including inclusive education, healthcare services, and vocational training for employment. Community inclusion and legal rights protection are essential, along with family support and accessibility to public spaces. Rehabilitation programs for individuals with intellectual disabilities in India focus on enhancing independence and quality of life. Key elements include early intervention, special education, therapeutic services, vocational training, community-based rehabilitation, assistive devices, and family support (Gawali, 2024).

It has also been stated in the Disabilities Act 2016 document with respect to **"accessibility",**

"*The Central Government shall, in consultation with the Chief Commissioner, formulate rules for persons with disabilities laying down the standards of accessibility for the physical environment, transportation, information and communications, including appropriate technologies and systems, and other facilities and services provided to the public in urban and rural areas*"

People with disabilities (PwD) face barriers to accessing and performing at the workplace, which impacts their participation in the labor market. Their productivity is mainly influenced by the nature of their disability and the demands of the job. (Naraharisetti & Castro, 2016).

According to International Labour Organisation,

*"**Persons in employment** or **the employed population** comprise all those of working age who, in a short reference period, were engaged in any activity to produce goods or provide services for pay or profit."*

The 2011 Census indicates that nearly one-third of individuals with disabilities are employed. Nationwide, 36% of the disabled population is engaged in work with 47% being men and just 23% women (Ministry of Statistics and Programme Implementation, 2016).

Employment is an important aspect of life for many adults, providing both income and a sense of purpose. People often dedicate a significant amount of time to their jobs, which also helps define their identity, fosters connections with others, and

supports personal growth. (Jahoda, 1981; Judge & Klinger, 2008). The employment rate for individuals with intellectual disabilities (ID) is notably low. Additionally, many individuals with ID voluntarily leave their jobs, with job retention posing a greater challenge than obtaining employment (Moran et al. 2001).

RESEARCH OBJECTIVE

To explore the factors influencing employment accessibility for Persons with Intellectual Disabilities

RESEARCH QUESTION

What are the factors influencing employment accessibility for Persons with Intellectual Disabilities?

RESEARCH METHODOLOGY

This study employs a narrative review of literature examining relevant studies and articles published in the last 10 years to gather insights related to the accessibility of employment for Persons with Intellectual Disabilities (PwID).

REVIEW OF LITERATURE

International Studies:

Wendelborg et. al., (2022) explore how people with intellectual disabilities (ID) are recruited and employed in Norway's competitive labor market. The study employed a survey of 478 employers to analyse recruitment methods, work conditions, and the support available. The findings show that private companies are more likely to hire people with Intellectual Disability than public ones, often with help from the Norwegian Labour and Welfare Administration (NAV). The research suggests that better collaboration with upper secondary schools and more support could help improve job opportunities. The study concludes that the private sector's flexibility in rules for rules and stronger partnerships between schools and employers could lead to more employment for people with Intellectual Disability.

Taubner et. al., (2021) conducted a systematic review of international research on employment sustainability for individuals with intellectual disabilities (ID) from 2010 to 2020. The review

analyzed 10 studies using both qualitative and quantitative methods. The Participants included individuals with Intellectual Disability working in various employment settings. The data collection was conducted through interviews, surveys, and registers and analyzed using a framework matrix. The findings highlighted limited research, inconsistent definitions, and factors like education and supportive networks as facilitators, whereas stigma acted as a barrier. The authors concluded that more multidisciplinary research is needed and recommended standardizing definitions and creating supportive employment systems.

Park & Park (2019) explored the elements affecting job opportunities and retention for individuals with intellectual disabilities. They worked with 398 participants, using surveys and adopted statistical methods like chi-square , t-tests and other relevant tests to analyze the data. Assistance of caregivers were provided to the participants who required it during the interviews. The study found that being older, having more education, strong family support, and better skills made it easier to find jobs, while receiving government aid often made it harder. People in manufacturing jobs or from higher-income families were more likely to stay employed. The study suggested improving skill training, adjusting aid policies, and creating more job opportunities for people with ID.

Akkerman et. al., (2016) examined job satisfaction among people with intellectual disabilities in integrated and sheltered workplaces. The aim of the study was to find factors that affect satisfaction as well as compare levels in both settings. The study reviewed 13 studies, and it was found that most people with Intellectual Disability were satisfied with their jobs, with more probability satisfied in integrated workplaces. Factors influencing satisfaction included personal traits, workplace conditions, social connections, support, and how well the job matched their needs. The study recommended focusing on these factors and involving people with ID in career decisions to improve their intent to work more, fostering a sense of autonomy, and satisfaction.

Ellenkamp et. al., (2015) reviewed studies to identify work environment factors that help people with intellectual disabilities (ID) obtain and keep jobs in competitive settings. The

study aims to understand the key factors that influence employment success for people with ID. They analyzed 1932 articles in total and then filteration process was done according to the requirements and eventually 26 relevant ones were selected from sources like PubMed, PsycINFO, and Web of Science. The review highlighted four main areas which included employer decisions, job tasks, workplace culture, and support from job coaches. The findings showed that these factors play a crucial role in job retention. The authors concluded that more research is needed and recommended focusing on these factors to improve employment outcomes for individuals with ID.

National Studies

Gawali (2024) conducted a descriptive and qualitative study to understand intellectual disability, its training and rehabilitation needs, and the programs available in India. The study highlighted challenges such as stigma, limited access to education, healthcare, and vocational training, and also presented gaps in policy implementation. The findings revealed a higher prevalence of intellectual disabilities in states like Maharashtra and Uttar Pradesh. The study concluded that promoting inclusion, addressing stigma, and strengthening support systems are essential. Recommendation includes enhanced awareness, better resource allocation, and family support mechanisms.

Soman & Manjooran (2023) studied disability inclusion in Indian workplaces . They reviewed laws like the RPWD ACT 2016 and surveyed companies. Their study also focuses on the responsibilities of the employer.Their findings revealed challenges such as stigma, inaccessible facilities, and insufficient accommodations. They highlighted how inclusive hiring and better workplace adjustments can benefit both employees with disabilities and organizations by fostering creativity and fairness. The study called for more rights-based approaches to create supportive, inclusive work environments.

Venkatesan (2021) explored various employment models for individuals with intellectual disabilities in India, such as sheltered employment, supported employment, competitive employment, and self-employment. The study followed a

theoretical approach, reviewing existing data from research and policies. It highlighted challenges like social stigma, limited opportunities, and employer ignorance. The findings revealed that employment improves their quality of life, independence, and social status. The study concluded by emphasizing the importance of inclusive practices and recommended enhanced governmental and corporate initiatives to promote job opportunities for individuals with Intellectual Disabilities.

Ramachandra et. al., (2017) investigated the difficulties faced by individuals with disabilities in finding jobs within the IT and IT-enabled industries in Hyderabad, India. The study aims to understand the viewpoints of employees as well as employers with respect to difficulties faced by individuals with disabilities. The study used semi-structured surveys with 200 participants from six companies. The analysis revealed that issues like physical accessibility, communication difficulties, and biased attitudes were key barriers. Only 3.8% of employers had formal policies for hiring PWDs. The study suggests the need for inclusive policies and better workplace adaptations to support PWDs in securing employment.

Naraharisetti & Castro (2016) studied the challenges people with disabilities (PwD) face in getting jobs in India using data from the 2001 Census. They used statistical methods to compare rural and urban areas. The study found that Women and illiterate PwD struggled more in cities, while mental disabilities were a bigger hurdle in rural areas. They discovered that factors like gender, literacy, and the type of disability played a major role and affect job opportunities differently in cities and villages. The authors recommended making job programs specific to the needs of PwD in different areas for better results.

FINDINGS

Based on the analysis of the literature , following could be highlighted :

- **Prevalence of Intellectual Disability in India:** States like Maharashtra, Andhra Pradesh, and Uttar Pradesh have higher populations of PwID, while regions such as Andaman & Nicobar Islands, Chandigarh, and Lakshadweep report lower percentages.

- **Challenges Faced by PwID in Employment:** Lower employment rates compared to other disability groups. Barriers include limited education, lack of skill development, workplace discrimination, and inadequate legal enforcement. Insufficient workplace accommodations and negative employer attitudes result in frequent job loss and underemployment.
- **Role of Family Support:** Family support increases employment rates, job retention, and stability for PwID. Practical assistance, moral support, and role modeling by family members contribute positively to employment outcomes.
- **Training and Vocational Needs:** Targeted vocational training, self-advocacy programs, and workplace adaptation skills improve employability. Vocational ability strongly correlates with higher employment rates and job sustainability.
- **Impact of Psychological Variables:** Self-esteem, employment motivation, and self-concept positively influence employment but are hindered by dependency on government benefits. Employment enhances psychological well-being and fosters self-determination among PwID.
- **Transportation and Socio-Economic Factors:** Access to transportation and parental education levels influence job type and employment opportunities. Higher household incomes positively impact job retention and employment rates.
- **Employment Models and Strategies:** Sheltered employment and subsidized roles are common, but ordinary positions in smaller companies show higher inclusion rates. Public-private partnerships and CSR programs are promising strategies to promote PwID employment.
- **Workplace Contributions by PwID:** PwID display punctuality, dedication, and low turnover rates. However, they require mentorship, customized roles, and supportive co-workers to thrive in their jobs.
- **Barriers to Long-Term Employment:** Stigma, discrimination, lack of advancement opportunities, and limited

supportive policies hinder long-term employment sustainability. Invisible disabilities and being female further reduce the likelihood of job retention.

- **Employment Sustainability/Retention Factors:**

Factors like secondary education, independent living, flexible employers, and supportive networks contribute to long-term employment. Barriers include stigma, unsafe work environments, and lack of advancement opportunities.

- **Policy and Institutional Gaps:** Inconsistent implementation of the policies. Limited reach of vocational rehabilitation centers and employment exchanges in including PwID.
- **Need for Awareness and Advocacy:** Stigma and misconceptions about PwID productivity hinder workplace inclusion. Awareness programs and advocacy campaigns are essential to fostering an inclusive environment.
- **Support Systems and Accessibility:** Community-based rehabilitation (CBR) and assistive technologies play a key role in enhancing PwID independence. Employers and families require targeted guidance to ensure workplace accommodations and long-term care.

CONCLUSION

Empowering Persons with Intellectual Disabilities (PwID) through better employment opportunities is a critical step toward India's inclusive growth by 2047. Despite existing challenges, such as discrimination and limited resources, there is potential for change through targeted efforts like vocational training, family involvement, and policy reform. Promoting workplace inclusion and accessibility will not only enhance their quality of life but will also contribute to a stronger, more diverse economy. Building an inclusive environment for PwID, India will be better positioned to meet its future goals.

RECOMMENDATIONS

- PwID should get the right education and job training to help them gain useful skills for employment.

- Equip families with the knowledge to support PwID, which eventually can helping them keep their jobs.
- Employers should make changes to their workplaces, like using assistive tools, to make things easier for PwID.
- Running awareness campaigns can help employers understand the value PwID bring to the workplace and encourage more recruitments.
- Strengthen the enforcement of laws protecting PwID from discrimination at work.
- Collaborations with both government and businesses can create more job opportunities for PwID.
- Improve transportation for PwID to help them get to work more easily.
- Setting up mentorship programs can help PwID adapt and succeed in their jobs.
- Focus on creating equal job opportunities for women with disabilities.
- Employers should offer flexible roles and clear paths for growth to help PwID thrive in the long run.

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ROLE OF INDIAN DIASPORA IN NATIONALISM AND ITS PROGRESS

Bijender Singh[1] and Vidushi Joshi[2]
[1]Assistant Professor, [2]Research Scholar, Department of Teacher Govt. Raza P. G. College, Rampur, Uttar Pradesh

ABSTRACT:

Millions of people of Indian descent who reside outside of India, make up the Indian diaspora which has contributed significantly to the growth of Indian nationalism as well as the socio-economic and political advancement of the nation. The historical foundations of the Indian diaspora, its social-political effects on India and its role in the country's development are all discussed in this paper. It explores the ways in which the Indian diaspora impacted the Indian movement of independence, promoted economy expansion, help spread Indian culture around the world and shaped India's reputation abroad. This paper also emphasizes on how the diaspora continues to play a significant role in the development of modern India in the areas of foreign policy, investment, remittances and knowledge sharing.

Keywords: Indian Diaspora, Nationalism, Indian Movement of Independence, Social-political relations, Economic Expansion, Global representation.

INTRODUCTION:

In nations ranging from Canada, the Middle East, The United States of America, The United Kingdom, African countries, South East Asia and across the world, millions of people of Indian descent spread globally make the Indian diaspora. It is one of the biggest diaspora in the world. The Indian diaspora has established itself as the best thriving community over the ages. The influence of the Indian diaspora on India's development has been profound specially in developing nationalism and fostering its global progress in a wide number of fields. The Indian diaspora is a varied collection of individuals who have spread out around the globe bringing with them a variety of personalities, majorly shaped by the diverse cultural past and experiences. The origin of the word "Diaspora" is said to have sprung from the combination of two

words, “Dia”, Which means “away”, and “Speirein”, which means “spread” or “sow.” It conveys the idea of being scattered or sowed outside of the homeland.

From the initial days of migration, through the post independence era and till now the relationship between the diaspora and our nation has gradually and significantly evolved, which continues to influence India’s political, economic and cultural arenas crucially. This paper aims to study the diverse contributions of Indian diaspora in the development of Indian nationalism and its role in the advancement of the nation, through analyzing how the diaspora aided the Indian independence movement, shaped the country’s post independence course, geo-political strategies, cultural transformation while serving as a bridge between India and the rest of the world and also remaining a significant contributor to India’s aspirations for global prominence.

Historical Overview Of The Indian Diaspora:

While Indians have been migrating outside for centuries for the purpose of business, export and import of various goods and raw materials, travel and education; mass migration or large scale migration started during the British colonial control. Oppressive colonial policies such as slavery or forced labour system resulted in the establishment of massive Indian populations specially throughout the British Empire including the Caribbean and Africa. These early migrants who migrated even before India gained its independence in 1947, made the pioneer diaspora, they played a vital role in preserving ties between India and rest of the world.

- **Colonial and Pre-Colonial Era of Early Migrations:** Due to trade, exploration and military conquests migration patterns from the sub continent immersed, resulting in a diaspora that predates British colonialism. Since the early years of Common Era, India has maintained a presence in the Southeast Asia, the Middle East and portions of Africa, mostly due to commercial interests (Cohen, 1997). Nonetheless, the 19th and early 20th centuries mark the significant period of the greatest migration. Millions of Indians were employed by the British Empire’s indentured labour system in plantations, mines and

railroads throughout Southeast Asia, the Caribbean, Fiji and Africa. Despite The struggles an exploitation, these migrants also brought aspects of Indian nationalism and culture with them, which served as a basis for the eventual growth of Indian identity in the diaspora (Tinker, 1974).

- **The Post-Independence Era:** In particular, Indian migration to Western nations including the United States of America, the United Kingdom and Canada underwent a new phase after 1947. This movement was a result of India's post independence socio-economic policies such as labour exportation agreements and international educational possibilities rather than colonial ones (Mishra, 2007). The Indian diaspora gained influence and prominence during this time, especially as many of its members achieved success in industries including academics, technology, business and medicine. One of the most prominent achievements of the contemporary Indian diaspora is the emergence of Silicon Valley as a centre of technical enterprises of Indian decent (Gupta, 2018).

The Role of Indian Diaspora in Nationalism and The Freedom Struggle:

India's political struggles, specially the fight for independence, have always involved the Indian diaspora. The diaspora especially those in the UK, the US, and southeast Asia provided substantial support to a number of Indian nationalist parties who were fighting to free their beloved homeland during the British colonial era.

Diaspora support and The Indian National Congress:

The support of the Indian diaspora was crucial to the Indian National Congress which spearheaded the fight for India's Independence. Various Diaspora groups provided leaders like Lala Lajpat Rai and Netaji Subhash Chandra Bose with receptive audiences, which helped them raise money, disseminate nationalist ideas, and advocate for India's Independence internationally (Gupta, 2011). The Ghadar Party, a political organization with headquarters in the US and Canada was one of the most important contributions made by the Indian diaspora. Sikh immigrants in

North America founded the Ghadar Party, which promoted the violent overthrow of British colonial power in India. By publishing the Ghadar newspaper, which reached many readers in the diaspora. It was instrumental in coordinating and disseminating anti-colonial sentiment (Upadhyay, 2014).

Contribution of Indian diaspora leaders in the movement of independence of India:

Prominent and influential members of the Indian diaspora who fiercely advocated for India's independence were Lala Lajpat Rai, Sardar Bhagat Singh and Subhash Chandra Bose. A key turning point in the diaspora's participation in Indian National Movement was the formation of Indian National Army or the I.N.A. by Netaji Subhash Chandra Bose during the Second World War with the assistance of Japanese forces. In Southeast Asia, Netaji turned to the Indian diaspora for support especially in Malaysia and Singapore where he received strong support for the cause (Current Intelligence Study Number 24, June 8, 1945).

Influence of Indian diaspora on the political environment of India after independence:

Political scenario in India post independence was also influenced by the Indian diaspora. Many members of the Indian diaspora played an active role in influencing India's foreign policy of the 1947, and it's further evolution, serving as a bridge between India and the nations in which they had relocated. Specifically during times like the Kashmir dispute, Indian community in the US and the UK pushed for the worldwide backing for India's position in the UN (Tiwari, 2019).

Effect of the Indian diaspora on the economy:

Indian diaspora has played a pivotal role in the economic sector of our country. It has contributed remarkably by bringing in foreign investments, through commercial alliances, trade promotions and facilitating bilateral trade relations between our country and rest of the world.

Foreign Direct Investment (FDI) and Remittances:

The Indian diaspora has helped India to attract foreign

direct investment as many Indian company owners in the US, the UK and the Middle East have made investments in Indian companies especially in the industries from the fields like telecommunications, technology and pharmaceuticals. The accomplishments of Indian multinational corporations like- T.C.S.- Tata Consultancy Services, Infosys and Wipro, are much to the credit of the knowledge and investments directed by the Indian diaspora (Chandran, 2015). Remittances are the transfers made in the form of goods or cash in general, by the migrants from their earnings in order to support their families at home. It is important to mention that the Indian diaspora has been one of the biggest global remittance sources. In the year 2019 alone India was the biggest beneficiary of remittances worldwide as more than 83 billion dollars was sent home by the Indian diaspora (World Bank, 2020). And in the year 2023, the remittances surpassing the foreign direct investment, crossed 650 billion dollars (World Bank Group, 2024). These remittances are essential to rural India's economic growth because they give families the money they need to make investments in infrastructure, healthcare and education.

Contribution in economy reforms and policy making:

India's economic policies have also been significantly shaped by the Indian diaspora. Indian economists and business executives in the diaspora played a significant role in the economic liberalisation of 1991 that exposed India to international markets. A number of well known members of diaspora like investment banker Raghuram Rajan and renowned economist Jagdish Bhagwati have been instrumental in advising Indian politicians on economic liberalisation and various reforms.

Contribution in spreading Cultural Influence an Indian Identity:

In addition to the political and economic accomplishments the Indian diaspora has been instrumental in promoting Indian culture and a worldwide sense of Indian identity representing the principle of 'Vasudhaiva Kutumbakam'- world is one family. The diaspora promotes Indian ideals of peace and brotherhood, customs and artistic expressions globally, acting as a cultural ambassador for the country.

Indian Cinema Industry:

The Indian diaspora has contributed significantly to Bollywood's growth into a worldwide cultural phenomenon. Bollywood films are now well known all over the world because of the adoption of Indian cinema by diasporic groups, especially in the U.S., the U.K. and Canada. India's soft power has been projected internationally which is credited to the diaspora's passion for Bollywood, which has made Indian music and cinema a vital component of global culture (Kapur, 2005).

Contribution in representing culture and festivals globally:

Celebrations of festivals representing culture in nations like the U.S., the U.K. and Canada where there is a sizable Indian community Indian holidays like Diwali, Holi and Navratri have grown in popularity. In addition to bringing the Indian diaspora together, these celebrations have aided in bringing Indian cultural customs to a wider audience around the world. For instance thousands of non- Indians attend Diwali celebrations in big cities like London and New York which promotes intercultural communication and understanding (Jain, 2015).

Contribution towards language and literature:

The global dissemination of Indian languages and literature has also been greatly aided by the Indian diaspora. The demand for learning Hindi as a language amongst foreign nationals has increased, reason being the fascination of Indian culture and it's portrayal. Writers such as Vikram Seth, Ruskin Bond, Arundhati Roy, R.K. Narayanan, Khushwant Singh, have become well known worldwide and many people read their books. In order to preserve India's linguistic Richness and promote it to a worldwide audience, the Indian diaspora has continued to speak Indian languages specially Hindi, Punjabi, Gujrati, Tamil and Malayalam (Singh, 2019).

CONCLUSION:

The growth of Indian nationalism and the advancement of the country have been significantly influenced by the Indian diaspora. It has played a transformative role in the country's

development and progress. The Indian diaspora has been playing a pivotal role in forming India's international character, from the time of its participation in the liberation movement to its contribution in the contemporary political, economic and cultural arenas. The non resident Indian community has been the driving force in shaping our country's global identity. It has had a significant impact on India's political movements, economic policies, technical developments and cross cultural interactions. As India continues to grow as a major world power, the diaspora will continue to be a vital ally in its progression. In addition to serving as a living testament and evidence of the Indian people's tenacity, resilience and solidarity, the diaspora is a vital factor behind India's rise in the international community.

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THE ROLE OF INNOVATION IN MAKING ATMANIRBHAR BHARAT

Jeet Singh
Assistant Professor, Department of Commerce, Government Degree College, Sambhal (U.P.)
e-mail: jsy2626@rediffmail.com

ABSTRACT

Research and innovation must be at the core of India's growth plan if it is to genuinely become a developed country, or Viksit Bharat. India can compete on a global scale and offer indigenous solutions to difficult problems in fields like healthcare and agriculture by cultivating a strong culture of research-based entrepreneurship.In order to propel innovation and economic expansion in India, the shift from researcher to entrepreneur is not only feasible but also crucial. Researchers can help achieve Atmanirbhar Bharat by utilizing their special talents and perspectives to create MSMEs and SMEs that benefit their communities as well as themselves. The moment has arrived for researchers to enter the entrepreneurial field as India aspires to become a worldwide leader. Seize the chance and allow research to help shape the future of national growth and corporate innovation. The research objectives tries to understand the Atmanirbhar Bharat Abhiyan; analyse the pillars of Atmanirbhar Bharat Abhiyan and to highlight the role of research and innovation in shaping Atmanirbhar Bharat. The role of research and innovation in shaping Atmanirbhar Bharat was discussed with industrialists, faculty members, and students in Moradabad and Sambhal cities of U.P. The paper concludes with the fact that India can develop new industries that meet the demands of its quickly expanding economy by turning scholarly research into profitable business endeavors, guaranteeing that the advantages of advancement are felt throughout the country.

Keywords: Atmanirbhar Bharat Abhiyan, Innovation, Research, Entrepreneurship, Vikshit Bharat

INTRODUCTION

COVID-19 has severely affected the Indian economy and

the masses. In an attempt to help India become more self-sufficient and recover from this crisis, Indian Prime Minister Shri Narendra Modi introduced the Aatmanirbhar Bharat Abhiyan. Around the beginning of 2020, a sudden outbreak struck the planet, prompting most nations to impose a total lockdown. Naturally, most industries saw a steep decline in sales, and companies suffered large losses. In this connection, the Prime Minister unveiled the Aatmanirbhar Bharat initiative. It arrived as a ¹ 20 lakh crore economic package to help India and its economy through this difficult time. With this package, this mission primarily focused on five elements: demand, infrastructure, systems, economy, and a thriving population. Additionally, through independent programs and policies, the Ministry of Tribal Affairs (MoTA) aggressively pursues the AatmanirbharBharatAbhiyan.The definition of MSMEs has changed, among other government choices, as part of the Atmanirbhar Bharat package, growing FDI in the defense sector, expanding the opportunities for private engagement in various areas, and gaining traction in many industries, including the solar manufacturing sector.

REVIEW OF LITERATURE

World Bank (2021): Recognized the positive impact of infrastructure development but urged greater investments in human capital.

OECD Report (2022): Praised the renewable energy goals but stressed the importance of technological innovation and R&D.

Rajeev et al. (2022): Pointed out gaps in rural credit access as a major bottleneck.

UNDP India (2021): Examined how Atmanirbhar Bharat aligns with sustainable development goals (SDGs), particularly in promoting inclusive growth.

Scholars like Arvind Panagariya (2021) suggest that excessive emphasis on import substitution might conflict with India's global trade commitments.

Bhanumurthy and Mishra (2021): Analyzed the financial allocation to sectors and its multiplier effects on employment and growth.

Chakravarty (2021): Focused on the challenges in implementation, particularly the structural inefficiencies in MSMEs and agriculture.

Some analyses have critically examined the effectiveness of the Atmanirbhar Bharat Abhiyan. For instance, an article in the *Journal of Development Policy and Practice* concludes that the initiative cannot be considered a successful policy intervention and suggests the need for policy reorientation. (Majeed, M., & Mushtaq, S. O. (2022))

The initiative has also been analyzed for its impact on specific sectors. A study published in the *Economic and Political Weekly* discusses the enhancement of the Domestic Value Addition (DVA) content of exports as an underlying objective of the Atmanirbhar Bharat Abhiyan. (Aggarwal, S., et.al. 2023)

The mission is built upon five significant pillars: Economy, Infrastructure, System, Demography, and Demand. These pillars are intended to drive India's transformation into a self-reliant nation. The initiative also emphasizes sectors such as Rural Tourism, Electronics, Information Technology, and Modern Agriculture as potential areas for substantial growth. (Shete Shritish, Dave Siddhi (2021))

RESEARCH METHODOLOGY

This study has been done to look into the scenario of innovation and research in shaping Atmanirbhar Bharat.

The objectives of the present study are:

- To understand the Atmanirbhar Bharat Abhiyan;
- To analyse the pillars of Atmanirbhar Bharat Abhiyan
- To highlight the role of research and innovation in shaping Atmanirbhar Bharat.

Area of Study

The research is not related to a specific area but applies to the whole of India. The role of research and innovation in shaping Atmanirbhar Bharat was discussed with industrialists, faculty members, and students in Moradabad and Sambhal cities of U.P.

Their suggestions and views are included in this article. The article also takes into consideration the few research articles written on Atmanirbhar Bharat.

OBJECTIVES OR GOALS OF ATMANIRBHAR BHARAT ABHIYAN

The following summarizes the main goals of the Atmanirbhar Bharat Abhiyan:

1) Fortifying regional and local service providers and manufacturers.
2) Improving the balance of payments and trade imbalances to raise living standards.
3) Reaching complete independence for the nation and its people.
4) Making India the center of the world's supply chain.
5) Using fiscal stimulus to revive all economic sectors.
6) Stressing independence while concentrating on labor, land, liquidity, reforms, and legislation.
7) Offering economic stimulus plans worth ten percent of India's gross domestic product.
8) Providing extra grants and incentives to farmers and small businesses impacted by COVID-19.

FEATURES OF ATMANIRBHAR BHARAT ABHIYAAN

The features of Atmanirbhar Bharat Abhiyan are highlighted herein below:

1) Job Creation: The Atmanirbhar Bharat Rozgar Yojana and increased financing for MGNREGA were implemented.
2) Health Sector Expenditure: Extra money for development of COVID-19 vaccines and public health campaigns.
3) Education Reforms: Focus on high-quality, technology-driven education via platforms like PM eVIDYA and SWAYAM PRABHA DTH channels.
4) Ease of Doing Business: Put your energy into making business

easier by streamlining regulations, implementing IBC-related projects, and loosening the General Financial Rules.

5) Financial Assistance for Industries: Launch of the Atmanirbhar Bharat Public Sector Enterprise Policy and the Emergency Credit Line Guarantee Scheme (ECLGS).

6) Agricultural Boost: extra funding through NABARD, a program for Micro Food Enterprises, and Emergency Working Capital for farmers.

7) Assistance to States: To improve financing availability, State Governments' borrowing limitations were raised to 5%.

NEED OF ATMANIRBHAR BHARAT ABHIYAN

The need of atmanirbharbharatabhiyan is arises due to the following:

1) Encourage Domestic Manufacturing: To increase the domestic manufacturing sector's percentage of GVA, which has been stagnant for the last ten years.

2) Lessen Import Dependency: To improve exports, lessen the fiscal imbalance, and lessen an excessive reliance on imports.

3) Encourage Indigenous Products: Encouraging regional and indigenous goods from across the nation.

4) Reform Outdated Policies: Enacting radical changes to laws, taxation, human resource management, financial systems, and agricultural supply chains in order to address policies that have been in place for a century.

5) Philosophical Alignment: Consistent with the Mundaka Upanishad's reference to "EshahPanthah," or self-sufficient India.

PILLARS OF ATMANIRBHAR BHARAT

The Five pillars of Atma Nirbhar Bharat focus on:

1) Economy: This pillar focuses on expanding the economy by supporting various industries, enhancing infrastructure, and making conducting business easier. These are changes aimed

at enhancing India's resilience and competitiveness. Since MSMEs account for about 95% of all industries and make significant contributions to the national income, it is only fitting that they will play a significant role in the foundation of Self-Reliant India, as the country will require a strong spine in order to stand tall.

2) **Infrastructure**: The development of nationwide infrastructure that will enhance connectivity, logistics, and industrial expansion is the main goal of this pillar. The goal of infrastructure investments is to stimulate economic growth and the creation of jobs. India is havngone of the greatest rail networks in the world (spanning 1,23,236 km) and the second largest road network in the world (5.5 million km). In international trade, logistics expenses are very important. With Bharatmala (Road and Highways project) and Sagarmala (for Port/Maritime infrastructure) kind of grand vision in action, India is pushing hard to bring down its logistics costs to match with global average and achieving a gradual success in this too.

3) **System**: It seeks to make governance systems more effective and business-friendly by enhancing labor laws, tax reforms, and regulatory frameworks. Improving the use of technology in government procedures and integrating it into the system is essential for creating a transparent governance framework.

4) **Vibrant Demography**: By making investments in jobs, education, and skills, we can capitalize on demographic dividends and turn our sizable population into a force to be reckoned with. Every nation's destiny could be altered by youth power. With 65% of its population under 35, India is the youngest country in the world. Empowered through Startup India, Standup India, Common Service Centres, Atal Innovation Mission, network of hundreds of 'Atal Tinkering' labs across the country, Skill India, and Village level entrepreneurs kind of initiatives, these young minds are enthusiastic to play a much larger role beyond traditional path.

5) **Demand**: Generating strong demand by stimulating domestic consumption and to increase people's purchasing power. After

the United States and China, India has the third-largest purchasing power parity (PPP) economy in the world. It ranks fifth in terms of nominal GDP rankings. A country with diversified culture, vibrant states, futuristic smart cities (all top 10 future cities of the world will be in India), thriving startup ecosystem, rising neo-middle class, and an emerging aspirational class even at the village level, always catches the eyes of global investors.

SUGGESTIONS

After going the above analysis, the researcher presents the following suggestions:

1) The pillars of atmanirbhar Bharat Abhiyan must be strengthened by the establishment of an underlying ecosystem of institutionalized skills development, cutting-edge research, and technology-driven innovations in order to be genuinely strong and resilient, built to survive any onslaughts of future new crises. A huge increase in top-tier businesses and entrepreneurs would be encouraged by this, generating new sources of income all around the nation.

2) The secret is to build a country of job-creators rather than merely job-seekers. And at the heart of this is the necessity of a broad partnership between the corporate sector, academics, and local, state, and central governments. The Covid-19 pandemic has in fact accelerated these synergies, which should be further leveraged.

3) By emphasizing the development of management, technical, and vocational skills and encouraging an innovative and entrepreneurial culture at the school, university, and industrial levels, we must facilitate the channelization of young people's energies into nation-building endeavors.

4) The development of digital and physical infrastructure in all of the nation's cities and villages will depend heavily on innovation and entrepreneurship. To become vibrant centers of innovation, job development, and livelihood facilitation, the country needs several hundred smart cities and smart villages. Innovations and businesses can benefit greatly from

smart housing, energy management, transportation, and water management.

5) In order to guarantee that advances in fields like education, healthcare, housing, and job enablement reach every average citizen, the infrastructure pillar would also need to build digital highways. Young, innovative entrepreneurs have a fantastic potential to take advantage of this and establish expanding businesses that have an international influence.

6) On the socioeconomic front, the time is right for microfinance and rural financing programs to encourage significant innovations and entrepreneurial endeavors. Ensuring gender equality, addressing economic inequality, and providing equitable opportunity for populations with disabilities are all vital. Rapidly expanding economies like ours must also be exceedingly cautious about concerns relating to climate change. Therefore, it is crucial that any organization's core goal continue to be the Sustainable Development Goals.

CONCLUSION

By concentrating on fortifying the aforementioned pillars, Atmanirbhar Bharat offers a genuinely historic opportunity to spark the creative entrepreneurial spirit of New India and guarantee an unparalleled surge of long-overdue growth, prosperity, and well-being that can also benefit the rest of the world.The restoration of the lockdown-haunted economy has been Atmanirbhar Bharat's primary focus. By bringing new optimism and zeal to a depressing atmosphere, our purpose engaged all sectors and provided society with a new platform and prospects. All that is required for the Aatmnirbhar Bharat Abhiyan is the appropriate application of policies and legislation created by the government.India's development depends on addressing concerns like food security, environmental sustainability, healthcare accessibility, and energy efficiency, all of which can be addressed through research and innovation. India can develop new industries that meet the demands of its quickly expanding economy by turning scholarly research into profitable business endeavors, guaranteeing that the advantages of advancement are felt throughout the country.

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TURNING CHALLENGES INTO OPPORTUNITIES: A DISABILITY-INCLUSIVE APPROACH TO SUSTAINABLE DEVELOPMENT AND SELF-RELIANCE IN INDIA

Tarun Kaushik[1], Ram Shanker Saxena[2] and S. S. Yadav[3]
[1]Student Int. B. Ed. M. Ed. Spl. Ed. (SLD), Amity Institute of Rehabilitation Sciences (AIRS), Amity University Uttar Pradesh, Noida., [2]Associate Professor, Amity Institute of Rehabilitation Sciences (AIRS), Amity University Uttar Pradesh, Noida.[3]Department of Chemistry, Govt. Raza P. G. College, Rampur, U.P

ABSTRACT

This study examines the challenges and openings of espousing a disability- inclusive approach to sustainable development and tone- reliance in India. Despite progressive legislation, similar as the Rights of Persons with Disabilities Act and the Accessible India Campaign, significant gaps in perpetration hamper full addition. The study identifies critical walls to education, employment, healthcare, and fiscal addition for individualities with disabilities, aggravated by shy structure, societal smirch, and limited mindfulness. It highlights the transformative eventuality of inclusive education, assistive technologies, and community- grounded enterprise in fostering independence and social integration. The findings emphasize the need for robust policy enforcement, enhanced resource allocation, and systemic reforms to address the unique requirements of persons with disabilities. Inclusive education emerges as a foundation, taking trained preceptors, accessible structure, and acclimatized learning approaches. Assistive technologies, similar as mobility aids and digital tools, show pledge but remain inapproachable to numerous due to high costs and limited vacuity. Employment openings for individualities with disabilities are constrained by plant impulses and inadequate lodgement, emphasizing the significance of incentivizing inclusive hiring practices. To achieve sustainable development pretensions, the paper advocates for

comprehensive strategies that prioritize availability, equity, and commission. Recommendations include strengthening policy perpetration, fostering public-private hookups, and promoting mindfulness juggernauts to strike smirch. By embracing inclusivity, India can transfigure disability- related challenges into openings, no bone is left before in its trip toward an indifferent and sustainable society.

Keywords: Disability inclusion, sustainable development, self-reliance, inclusive education, India, assistive technology, policy enforcement, community-based rehabilitation, vocational training, accessibility.

INTRODUCTION:

Education is the spark that lights the fire of curiosity, guiding individualities on a lifelong trip of discovery and growth. It is n't simply the transfer of knowledge but the awakening of the mind, the nurturing of implicit, and the civilization of values that shape character.

Like a ground, education connects dreams to reality, equipping us with the tools to navigate challenges and seize openings. It's a symphony of literacy — formal and informal, structured and robotic — harmonizing knowledge, creativity, and wisdom.

Education teaches us not only to read books but to read the world, to question, to introduce, and to empathize. It unlocks doors to new perspectives, fosters collaboration, and empowers us to produce a brighter future. In its substance, education is the seed from which progress grows, the compass that directs our path, and the light that illuminates the measureless impairs of mortal eventuality.

Special education is an acclimatized approach to tutoring that addresses the unique literacy requirements of scholars with disabilities, icing they've equal access to quality education. It encompasses a wide range of services, programs, and strategies designed to support scholars with physical, intellectual, emotional, or experimental challenges. Special education recognizes that every learner is different and adapts tutoring styles, accoutrements, and

surroundings to suit individual capacities.

At its core, special education focuses on creating inclusive literacy surroundings where all scholars can thrive. Individualized Education Programs (IEPs) play a vital part in this process, outlining specific pretensions and supports for each pupil. This substantiated approach ensures that scholars can overcome walls and achieve their fullest eventuality.

Special education also emphasizes collaboration among preceptors, parents, specialists, and other stakeholders. Together, they work to give a holistic frame that addresses not only academic progress but also social, emotional, and behavioural development.

Inclusive practices in special education foster empathy and acceptance among peers, helping to make a more compassionate and indifferent society. By feting and celebrating diversity in literacy, special education empowers scholars to develop confidence, independence, and a sense of belonging.

Eventually, special education is not just about tutoring else it's about understanding, conforming, and championing for every learner's right to succeed. It transforms challenges into openings and ensures that no child is left before in their trip toward growth and achievement.

Inclusive Education:

It refers to a system where all scholars, anyhow of their capacities or disabilities, learn together in a probative terrain that meets their different requirements. It embraces the gospel that every child has the right to education and should have access to equal openings, fostering an inclusive society. Inclusive education goes beyond bare physical access; it involves conforming tutoring styles, classes, and learning surroundings to feed to individual requirements. This approach promotes social integration, encourages empathy, and reduces smirch against children with disabilities.

Crucial factors of inclusive education include training preceptors in special education ways, furnishing assistive technologies, and icing accessible structure. programs like the Right

to Education Act (RTE) in India and transnational fabrics like the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) emphasize the significance of inclusive education.

Inclusive education not only benefits children with disabilities but also enhances the overall classroom experience by encouraging diversity and collaboration. It prepares all scholars for real- world relations and promotes equity in society. Challenges like lack of coffers, shy schoolteacher training, and societal smirch remain, but with combined sweats from policymakers, preceptors, and communities, inclusive education can come a reality.

Disabilities relate to physical, internal, intellectual, or sensitive impairments that hamper an existent's capability to perform everyday conditioning and interact with society on an equal base. Disabilities can be natural or acquired and may vary in inflexibility. In India, the Rights of Persons with Disabilities Act (RPwD) 2016 recognizes 21 types of disabilities.

1. Blindness
2. Low vision
3. Leprosy- cured persons
4. Hearing impairment (deaf and hard of hail)
5. Locomotor disability
6. Dwarfism
7. Intellectual disability
8. Mental illness
9. Autism diapason complaint (ASD)
10. Cerebral bonhomous
11. Muscular dystrophy
12. habitual neurological conditions
13. Specific literacy disabilities

14. Multiple sclerosis
15. Speech and language disabilities
16. Thalassemia
17. Haemophilia
18. Sickle cell anemia
19. Multiple disabilities
20. Acid attack victims
21. Parkinson's complaint

The Act ensures rights like education, employment, and availability while chastising demarcation. Admitting these disabilities fosters inclusivity in policy- timber, education, healthcare, and employment, icing a more indifferent society.

Sustainable development:

Sustainable development refers to a holistic approach to progress that meets present requirements without compromising the capability of unborn generations to meet their own. It balances profitable growth, environmental preservation, and social addition. The conception gained elevation with the United Nations' 1987 Brundtland Report and was farther solidified through the Sustainable Development Goals (SDGs) in 2015.

Crucial pillars of sustainable development include

1. Economic sustainability; - Promoting diligence, invention, and structure that foster growth without depleting natural coffers.
2. Environmental sustainability; -guarding ecosystems, promoting renewable energy, and reducing pollution to insure the earth's health.
3. Social sustainability; - championing for equity, addition, and access to introductory requirements like education, healthcare, and casing.

For persons with disabilities, sustainable development is critical as it emphasizes inclusivity, equal openings, and availability

in education, healthcare, and employment. Accessible structure, inclusive programs, and the creation of assistive technologies are vital.

India has embraced sustainability through enterprise like renewable energy expansion, Swachh Bharat Abhiyan, and schemes supporting marginalized groups. still, challenges like poverty, resource mismanagement, and social inequality remain significant. By fostering invention, encouraging community participation, and espousing environmentally friendly practices, sustainable development can produce a flexible and indifferent future.

Self- reliance refers to an individual or community's capability to meet their requirements singly without inordinate reliance on external support. It encompasses profitable, social, and cerebral aspects, enabling individualities to contribute productively to society while maintaining quality and autonomy.

For persons with disabilities, tone- reliance is essential as it empowers them to overcome societal and systemic walls, fostering independence and participation. Factors contributing to tone- reliance include access to education, vocational training, employment openings, healthcare, and assistive technologies. Inclusive education systems and workplaces play a vital part in erecting confidence and chops among individualities with disabilities.

India's" Atmanirbhar Bharat" action emphasizes tone-reliance at a public position, promoting original diligence, invention, and inclusive programs to support marginalized groups. still, achieving true tone- reliance for persons with disabilities requires addressing walls like societal smirch, lack of structure, and limited access to fiscal coffers.

Community- grounded recuperation (CBR) programs and skill development enterprise have demonstrated success in empowering individualities with disabilities. By fostering an inclusive terrain, championing for rights, and furnishing necessary support, tone- reliance can be achieved. This not only enhances the quality of life for persons with disabilities but also contributes to the broader thing of an inclusive and sustainable society. The

title, **" Turning Challenges into openings A Disability- Inclusive Approach to Sustainable Development and Self- Reliance in India," ** reflects the substance of an inclusive, transformative vision for societal progress. It highlights the need to address the systemic challenges faced by individualities with disabilities and convert these into pathways for growth, commission, and equity.

"**Turning Challenges into opportunities**" underscores the idea of reframing obstacles similar as inapproachable structure, societal smirch, and limited coffers into openings for progress. This involves creating adaptive results, using invention like assistive technologies, and fostering programs that empower individualities with disabilities to thrive.

"**A Disability- Inclusive Approach**" emphasizes the addition of persons with disabilities at every stage of development. It highlights the significance of removing walls and creating equal openings in education, healthcare, employment, and public services. Addition is n't simply about furnishing access but icing meaningful participation in decision- making processes, thereby fostering a sense of belonging and quality.

"**Sustainable Development and Self- Reliance**" relates to erecting a future that meets present requirements without compromising coffers for unborn generations, icing everyone, anyhow of capability, benefits from progress. For persons with disabilities, tone- reliance means penetrating the chops, tools, and openings to live independent, fulfilling lives. By addressing their unique requirements through inclusive programs and programs, society can empower them to contribute significantly to profitable growth and social cohesion.

In India, where different challenges like poverty, societal bias, and resource constraints live, this approach calls for robust collaboration between governments, communities, and private sectors. The title encapsulates a vision of holistic, inclusive progress, where challenges serve as catalysts for invention and occasion, paving the way for an indifferent and flexible society.

RESEARCH OBJECTIVES

1. To evaluate how effective the policies, laws, and programs

are in promoting the inclusion of individuals with disabilities within India's development framework.

2. To pinpoint and examine the obstacles to sustainable development and self-sufficiency encountered by individuals with disabilities in India.

RESEARCH QUESTIONS

1. What primary obstacles obstruct the integration of individuals with disabilities into India's sustainable development objectives?

2. In what ways do government initiatives like the Rights of Persons with Disabilities Act facilitate the empowerment of individuals with disabilities, and what are the gaps in implementation?

RESEARCH METHODOLOGY

This review weaves insights from peer-reviewed research, policies, and global frameworks to illuminate the path toward disability inclusion in India. Through thematic and comparative analysis, it uncovers challenges like societal stigma and policy gaps while assessing impactful initiatives. Ethically grounded, it offers fresh perspectives and actionable strategies for sustainable change.

REVIEW OF LITERATURE:

Raj (2021) reviewed the conception of disability-inclusive development, fastening on its integration into India's social and profitable structures. It examined the programs that aim to ameliorate the availability and equivalency of openings for people with disabilities. Despite the enactment of laws, perpetration issues persist, including structure gaps and limited societal mindfulness, pressing the need for better enforcement of the being fabrics.

Sharma (2020) identified the crucial walls precluding the participation of persons with disabilities in India's sustainable development pretensions. These included systemic walls like shy physical structure, inapproachable public services, and

discriminative stations. It underscored the need for systemic changes in policy and planning to make sustainable development truly inclusive.

Singh & Gupta (2019) fastening on profitable tone-reliance, this paper explored the walls persons with disabilities face in penetrating employment openings and profitable coffers. The review discussed how skill development programs, vocational training, and entrepreneurship enterprise can empower impaired individualities, fostering independence and integration into the broader frugality.

Patel (2018) assessed the impact of colourful government enterprise, including the Rights of Persons with Disabilities Act and Accessible India Campaign, on enhancing the lives of persons with disabilities. While these programs aim to ameliorate availability and addition, the study highlights gaps in perpetration and suggests further targeted sweats.

Verma (2022) examined the part of community- grounded programs in promoting social addition for persons with disabilities in India. It suggested that communities can be important enablers by fostering social networks, furnishing informal support, and promoting inclusive artistic practices that challenge smirch and demarcation.

Kumar & Sharma (2021) studied the challenges and stylish practices in inclusive education in India, fastening on scholars with disabilities. It discussed walls similar as shy coffers, lack of trained preceptors, and physical attainability in seminaries. The review advocated for systemic reforms to insure equal educational openings.

Mishra (2019) studied the availability and quality of healthcare services available to persons with disabilities in India. It emphasized the need for bettered recuperation installations, better trained healthcare professionals, and an inclusive approach that considers both medical and social requirements.

Joshi (2020) highlighted the transformative eventuality of assistive technologies in perfecting the independence of persons with disabilities. It covered inventions similar as mobility aids,

voice- actuated bias, and digital literacy tools, which empower individualities and enhance their participation in work, education, and social conditioning.

Rao & Singh (2018) in their study focused on the challenges faced by persons with disabilities in penetrating decent work. It reviewed being programs and practices aimed at adding employment openings but also highlighted persisting walls similar as employer bias, lack of plant lodgement, and limited training programs.

Mehta & Shah (2019) examined the fiscal addition walls faced by persons with disabilities, particularly in penetrating banking and insurance services. It reviewed current programs and practices, suggesting advancements similar as acclimatized fiscal products and services that meet the unique requirements of this demographic.

Gupta & Kumar (2020) in their study focused on the effectiveness of community- grounded recuperation (CBR) programs, which aim to enhanced the quality of life for persons with disabilities through localized interventions. It discussed both the successes and limitations of these programs, with a focus on their eventuality for promoting independence and tone- reliance.

Chawla, D., & Sharma, V. (2021) explored the challenges in furnishing education to children with disabilities in pastoral areas. It highlighted the difference in access to special education offers and structure and lawyers for programs that bridge the pastoral-civic peak in educational openings for impaired children.

FINDINGS

1. Government policies such as the Rights of Persons with Disabilities Act and the Accessible India Campaign have seen restricted effectiveness due to challenges in their implementation.
2. Employment, education, and healthcare continue to pose major obstacles for individuals with disabilities.
3. Community-based initiatives, notably rehabilitation programs,

have delivered encouraging outcomes but require broader implementation.

4. While assistive technology holds transformative possibilities, its usage remains limited in India.

5. Systemic obstacles within banking and insurance sectors hinder financial inclusion for individuals with disabilities.

RECOMMENDATIONS

1. Policy Enforcement: Reinforce the execution of disability-inclusive policies and ensure adherence through routine audits and community oversight.

2. Inclusive Infrastructure: Enhance physical infrastructure, such as accessible buildings, transportation, and public services, to facilitate greater involvement.

3. Education: Broaden the availability of inclusive education by allocating more resources, training educators, and improving infrastructure for children with disabilities, particularly in rural regions.

4. Employment Support: Foster workplace inclusivity by providing incentives for employers to recruit individuals with disabilities, including financial support and reasonable accommodations.

5. Assistive Technology: Improve access to assistive technologies by reducing costs, offering training, and integrating technology into educational and job settings.

6. Healthcare Accessibility: Guarantee that healthcare providers receive adequate training to meet the specific needs of individuals with disabilities and that rehabilitation services are widely available and accessible.

7. Financial Products: Create financial offerings specifically designed for the requirements of individuals with disabilities, including accessible banking services, insurance, and credit options.

8. Awareness and Advocacy: Launch national awareness

initiatives aimed at diminishing stigma and bias against individuals with disabilities, fostering social inclusion and fairness.

CONCLUSION

The literature review indicates that although notable advances have been made towards establishing an inclusive society for individuals with disabilities in India, considerable obstacles still exist. These challenges encompass insufficient enforcement of current policies, lack of accessibility in infrastructure, societal bias, limited educational opportunities, and inadequate employment assistance. A multifaceted strategy is essential to tackle these challenges, which should include more robust enforcement of disability-inclusive policies, community-based support mechanisms, inclusive education, and skills development initiatives. The significance of assistive technologies and vocational training in empowering individuals with disabilities is undeniable. Additionally, the financial sector needs to evolve to ensure that individuals with disabilities can fully engage in economic activities.

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THE VISION OF SELF RELIANT INDIA: ATMANIRBHAR BHARAT

Abhishek Mishra[1] and Mahendra Pal Singh Yadav[2]
[1]Research Scholar at Department of Commerce, MJP Rohilkhand University, Bareilly, [2]Assistant Professor at Department of Commerce, Govt. Raza PG College, Rampur, Uttar Pradesh
Email: abhishakemishra@yahoo.in)

ABSTRACT

The vision of a self-reliant India, articulated through the Atmanirbhar Bharat Abhiyan, aims to transform the nation into a resilient economy capable of reducing dependence on imports while promoting local production and consumption. Launched in May 2020 amid the COVID-19 pandemic, this initiative underscores the importance of self-sufficiency across various sectors, including manufacturing, healthcare, and agriculture, and seeks to harness India's demographic dividend through skill development and job creation.(Guwahati, 2024)(Maru, 2023)(MEASURES UNDERTAKEN TO BOOST MANUFACTURING SECTOR IN INDIA, 2021) The vision is notable for its emphasis on balancing self-reliance with global integration, ensuring that India remains an active participant in international markets while fostering domestic capabilities.(MEASURES UNDERTAKEN TO BOOST MANUFACTURING SECTOR IN INDIA, 2021)(Team, 2023) Key components of the vision include investments in digital infrastructure, enhancement of human capital, and strategic focus on 24 identified subsectors for import substitution, such as electronics and textiles.(An Idea on Atmanirbhar Bharat Abhiyaan, 2022)(MEASURES UNDERTAKEN TO BOOST MANUFACTURING SECTOR IN INDIA, 2021) Prominent government initiatives, such as the "Vocal for Local" campaign and various financial packages aimed at supporting micro, small, and medium enterprises (MSMEs), are central to this approach, intending to stimulate economic growth and innovation.(Testbook, 2024)(Testbook, 2024) Furthermore, the initiative reflects a commitment to environmental sustainability and the promotion of a circular economy, aiming to align economic growth with ecological well-being.(Sweta & Sweta, 2024)(Self-reliant India

(AATM Nirbhar Bharat Abhiyan) | IBEF, n.d.)

However, the vision faces significant challenges, including infrastructural deficits, regulatory complexities, and the need for technological adoption, which could impede effective implementation.(J & Majid, 2020)(Ojha, 2021)(Self-reliant India (AATM Nirbhar Bharat Abhiyan) | IBEF, n.d.) Critics express concerns that a shift towards protectionism may undermine India's competitive edge in the global economy, advocating for a balanced approach that nurtures both self-reliance and international cooperation.(MEASURES UNDERTAKEN TO BOOST MANUFACTURING SECTOR IN INDIA, 2021)(Team, 2023) As India strives to realize its goal of becoming a developed nation by 2047, the vision of a self-reliant India represents a transformative agenda aimed at fostering economic resilience, enhancing societal welfare, and addressing pressing environmental issues.(Sustainability in Indian Manufacturing: Challenges and Opportunities – Global Council for the Promotion of International Trade, n.d.)(Year End Review- 2021 Ministry of Micro, Small & Medium Enterprises, 2021)

INTRODUCTION

The vision of a self-reliant India, encapsulated by the Atmanirbhar Bharat Abhiyan, represents a transformative agenda aimed at fostering economic resilience, innovation, and sustainability. Launched in May 2020 during the COVID-19 pandemic, this initiative underscores the necessity of reducing dependence on imports while promoting domestic production and consumption across critical sectors such as manufacturing, healthcare, and agriculture (Guwahati, 2024; Maru, 2023). Central to this vision is the goal of turning challenges into opportunities by leveraging India's demographic dividend through skill development, job creation, and technological advancements (MEASURES UNDERTAKEN TO BOOST MANUFACTURING SECTOR IN INDIA, 2021).

Atmanirbhar Bharat is distinctive in its approach, balancing self-reliance with global integration to ensure that India remains a vital participant in international markets while simultaneously enhancing domestic capabilities. This dual

emphasis reflects the vision's core philosophy that self-reliance does not mean isolation but rather a nuanced approach to globalization—one that benefits both India and the global economy (Team, 2023). To achieve this, the initiative identifies strategic priorities, including significant investments in digital infrastructure, human capital enhancement, and a focused strategy on 24 subsectors identified for import substitution, such as electronics, textiles, and medical devices (An Idea on Atmanirbhar Bharat Abhiyaan, 2022; MEASURES UNDERTAKEN TO BOOST MANUFACTURING SECTOR IN INDIA, 2021).

KEY COMPONENTS OF THE VISION

Human Capital Development

A critical aspect of the Atmanirbhar Bharat vision is the development of human capital through skill development initiatives across various sectors. The growth of India's labor force and investment in education are essential to transforming the country's demographic advantage into a productive workforce(MEASURES UNDERTAKEN TO BOOST MANUFACTURING SECTOR IN INDIA, 2021). A comprehensive skill development program is deemed pivotal for ensuring that the labor market is equipped to meet the demands of a self-reliant economy.

Global Integration

While self-reliance is a primary goal, it is equally important for India to maintain active global engagement. Over-protectionism could potentially isolate India from global supply chains and diminish its competitiveness in the international market(MEASURES UNDERTAKEN TO BOOST MANUFACTURING SECTOR IN INDIA, 2021).

Therefore, the vision emphasizes a balanced approach that fosters self-sufficiency while ensuring that India remains integrated into the global economy.

Economic Resilience and Innovation

Proponents of the Atmanirbhar Bharat campaign stress that the initiative is not about reverting to protectionism or isolationism

but about fostering manufacturing and creating resilient economic policies(Team, 2023). The vision's five pillars—economy, infrastructure, technology-driven systems, vibrant demography, and demand—aim to build a sustainable and competitive economy capable of thriving in a globalized world. The COVID-19 pandemic highlighted the need for a shift in economic policy, prompting India to strive for a self-sufficient economy while maintaining its commitment to global cooperation(MEASURES UNDERTAKEN TO BOOST MANUFACTURING SECTOR IN INDIA, 2021).

Supporting Innovation and Startups

The Start-up India initiative is another flagship program aimed at fostering a robust ecosystem for innovation and entrepreneurship. This initiative seeks to generate employment opportunities and drive sustainable economic growth through the development of start-ups across the country(An Idea on Atmanirbhar Bharat Abhiyaan, 2022).

Challenges to Implementation

The vision of a self-reliant India, encapsulated in various government initiatives, faces numerous challenges that hinder effective implementation. These challenges range from infrastructural deficits to regulatory complexities and the need for technological advancements.

Infrastructural Deficits

One of the primary barriers to achieving self-reliance in India is the significant infrastructure deficit. The current logistics system, with an average logistics cost accounting for approximately 14 percent of GDP, is among the highest globally, which severely impacts the competitiveness of Indian manufacturing in both domestic and international markets(J & Majid, 2020). Transportation infrastructure, including roads and railways, is crucial; however, the current freight traffic distribution heavily favors road transport, contributing to inefficiencies and higher costs(J & Majid, 2020). Limited access to renewable energy sources and inadequate waste management further complicate efforts towards sustainable manufacturing practices(Ojha, 2021).

Regulatory Challenges

The regulatory landscape in India presents another layer of difficulty. Existing environmental regulations often lack the rigor necessary to motivate businesses towards sustainable practices. The enforcement of these regulations is frequently weak, allowing non-compliance to persist without significant repercussions(Ojha, 2021). This regulatory labyrinth necessitates the establishment of clear, enforceable regulations with robust enforcement mechanisms to ensure compliance and incentivize sustainable business practices(Ojha, 2021).

Technological Adoption

Technological adoption remains a critical challenge, particularly in the context of manufacturing growth. Many Indian manufacturers rely on outdated technologies and have limited research and development (R&D) capabilities, particularly in the renewable sector(Self-reliant India (AATM Nirbhar Bharat Abhiyan) | IBEF, n.d.). This reliance on international suppliers for technology and equipment undermines the objective of self-reliance and hinders innovation within the country(Self-reliant India (AATM Nirbhar Bharat Abhiyan) | IBEF, n.d.). The lack of local manufacturing for spare parts further exacerbates this issue, as it limits the ability to maintain and upgrade existing technologies efficiently.

Compliance Burdens

The burden of compliance, particularly for Micro, Small, and Medium Enterprises (MSMEs), has also been a significant hurdle. Although the government has taken steps to reduce this burden through initiatives such as the Udyam Registration and the MSME Sambandh Portal(Jayakumar, 2024), many small businesses still struggle with the complexities of public procurement policies and regulatory requirements. The constitution of review committees and grievance cells indicates a recognition of these challenges, but more comprehensive support systems are necessary to facilitate ease of doing business for MSMEs(Jayakumar, 2024).

Community Engagement and Local Governance

Effective local governance and community engagement

are crucial for the successful implementation of self-reliance initiatives. Strong local capacity in governance and financial management can lead to more tailored solutions that address local contex-ts(TeamLease Services Limited, 2025). However, the current pproach often lacks clarity regarding responsibilities, which can lead to misuse of autonomy and ineffective local governance(TeamLease Services Limited, 2025).

Future Prospects

The vision of a self-reliant India, articulated through initiatives like Atmanirbhar Bharat, sets a transformative trajectory for the nation's economic landscape. As the country seeks to enhance its domestic capabilities, particularly in sectors that have traditionally relied on imports, various prospects emerge for the future.

Embracing Digital Transformation

With the advancement of digital technologies, Micro, Small, and Medium Enterprises (MSMEs) are poised to harness increased productivity and sustainability through the effective integration of tools such as cloud computing, artificial intelligence (AI), the Internet of Things (IoT), blockchain, and automation. This digital transformation not only presents a pathway for growth but is essential for unlocking the full potential of MSMEs, ultimately reshaping the future of business in India amidst global competition (Kannoth, 2024).

Sustainable Manufacturing

The imperative for sustainable manufacturing highlights the need for Indian manufacturers to adapt to environmentally friendly practices. By understanding the complexities of transitioning to greener operations, businesses can pave a way towards economic prosperity that aligns with ecological well-being. This multifaceted approach promises to bolster resilience while addressing the urgent challenges of climate change(Ojha, 2021).

Policy Framework and Investment

The government's emphasis on clean energy and sustainable living, backed by substantial financial allocations,

showcases a commitment to achieving long-term environmental goals. Key initiatives, such as the Green Hydrogen Mission with an outlay of ₹19,700 crore, aim to transition the economy towards low carbon intensity and reduce reliance on fossil fuel imports, ensuring that India takes a leading role in emerging technologies(Cii Team, 2024). The collective vision of self-reliance encompasses a wide array of sectors, addressing fundamental aspects like land, labor, liquidity, and laws. The government's comprehensive approach aims to revive multiple sectors of the economy, positioning India on a path towards achieving its goal of becoming a developed nation by 2047(Sustainability in Indian Manufacturing: Challenges and Opportunities – Global Council for the Promotion of International Trade, n.d.).

CONCLUSION

India's adventure to self-reliance with the Atmanirbhar Bharat Abhiyan is a major change for economic growth, new ideas and strength. This vision aggressively promotes a culture of entrepreneurship, considerably strengthens local industries and resolutely prioritizes sustainability to firmly create India as a globally competitive economy while substantially reducing dependence on imports (Press Information Bureau, 2020). A strong focus on digital infrastructure, thorough skill development and large planned investments in important sectors powerfully supports India's ambitious aspiration to become a developed nation by 2047 (Economic Times, 2023).

Nevertheless, many obstacles are encountered on the adventure toward self-reliance. Overcoming these hurdles will be considerably helped by the dealing with of many infrastructural gaps, the simplification of several regulatory frameworks and the encouragement of a large amount of technical innovation (Kumar, 2021). Furthermore, India needs to pursue a balanced approach, avoiding an excessive degree of protectionism while actively engaging in several global partnerships and an important number of trade opportunities (World Bank Report, 2022). In this manner, an important harmonization of self-reliance and global integration can be achieved by India, thus guaranteeing that the large progress made benefits both its own citizens and the worldwide community

(Singh, 2020).

The success of Atmanirbhar Bharat is ultimately determined by a large amount of collective effort: governmental policies, a meaningful degree of private sector participation and many individual contributions (Confederation of Indian Industry, 2021). Through the powerful unification of these forces, India's vision of becoming a remarkably resilient, deeply sustainable and comprehensively all-embracing economy can be achieved, considerably reinforcing its position as a primary global leader and a shining beam of progress in the twenty-first century.

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ROLE OF SST IN ADOLESCENT

Yogesh Chandra
Assistant professor, psychology, Govt Girls Post Graduate College Rampur, Uttar Pradesh, Email: yogi.nimhans86@gmail.com

ABSTRACT

The term adolescence was derived from the Latin word 'adolescere', which means to grow up or to grow into maturity. It is defined as the phase of transition period between 11 and 19 years of age becoming being a child to an adult. A central task of adolescence is to develop progress from dependent to independent and a sense of oneself as an autonomous individual. During the transition process two broad challenges adolescents are facing (1) the entrance into production of the culture and society. To enter into production includes becoming an economically independent individual, decisions concerning schooling, education, and career. (2) the reproduction domain includes commitments to romantic relationships, building up intimate relations, founding a family, and taking care of children.

Adolescents are very prone to develop psychological problems such as sensation-seeking behaviour, sleep disturbance, body image, development of self-concept, self-image, and various internalized and externalizing disorders. There are various causes behind this some are biological and hormonal changes, Peer pressure, risk-taking behaviour, increased academic demands, social demands, and pressure.

India has the largest youngest population in the world. With this assumption, we have having largest human resource. In the era of a competitive world and demands for professionals, we have to think about these populations and take care of the healthy development of physical, mental, emotional, and moral development. This paper is aimed at above-mentioned problem, and how to sort these issues, over the past several decades, social skills training has become one of the most widely practiced techniques in clinical psychology.

Keywords: Adolescence, challenges, social skill training, models of social skill, steps of social skill training.

Role of social skill training in the adolescence stage

The first use of the term adolescence appeared in the fifteenth century. The term was derived from the Latin word 'adolescere', which means to grow up or to grow into maturity. Adolescence is the phase of transition period between 11 and 19 years of age becoming being a child to an adult. The adolescent experiences not only physical growth and change, mental change and growth but also emotional, psychological, and social.

The early adolescent (12 to 15 years) is understood as conflict with the new growth demands of this stage. The child major issued faced between submission and rebellion, sociability and isolation, friendships and enmities, overactivity and retreat, depression and overexcitement. Delinquency and acting-out are common. The struggle in this period is a process of resolution of sexual identity, object ambivalence, and needs for separation and individuation

In middle adolescence (14 to 17 years) there is some resolution of sexual conflicts with greater ability to relate. Narcissistic defences alternate with more mature coping mechanisms. Homosexual episodes, depersonalization, anxiety.

In late adolescence (17 to 21 years) separation-individuation accelerates, object choice solidifies, identifications strengthen. Identity crises, depression, and adjustment difficulties continue, however, often encouraged by available peer groups involved in sexual and deviant exploits.

A central task of adolescence is to develop progress from dependent to independent and a sense of oneself as an autonomous individual.

Adolescents face two broad challenges during the transition from childhood to adult life (1) the entrance into production of the culture and society. To enter into production includes becoming an economically independent individual, decisions concerning schooling, education, and career. (2) the reproduction domain includes commitments to romantic relationships, building up intimate relations, founding a family, and taking care of children.

As a period of many biological and social changes, adolescence is a unique age range involving both opportunities and vulnerabilities. Some adolescents are not able to adjust to the physical and psychological change resulting in various internal and external problems.

Moral development during adolescence is considered a social construct, these changes provide a context that shapes the development of morality, prosocial behaviour, voluntary behaviour comforting, sharing, and helping.

Sensation-seeking behaviour-

Desire to experience new sensations may result in poor decisions, experimentation with drugs or alcohol, risk-taking, sensation seeking, decision-making that reflects immediate gratification, an inability to sustain attention toward goal behaviours, and an inability to inhibit inappropriate behaviour. Peer pressure and risk-taking behaviour are major factors for sensation-seeking behaviour among adolescents.

Sleep disturbances-

The causes of inadequate sleep in adolescence especially during the school week drops significantly, increased academic demands, early school start times, social pressures, the use of alcohol, distractions of the Internet, and time-consuming after-school jobs lead to chronic sleep loss.

Self and gender-related-

During adolescence, girls and boys undergo important changes related to their gender that shape their self-concepts, beliefs, goals, and social relationships. Self-evaluations of body image are evident among adolescents. Body image emerges as a major defining issue of adolescence period. Some major challenges are changes in height, weight, secondary sexual characteristics, complexity to the self-concept, attitudes, academic achievement, athletic participation, body image, sexuality and sexual orientation, friendship intimacy, aggression, violence, and fear of negative evaluation by others. Peer experiences become an important contributor to self-evaluation and body image.

Body image plays a prominent role as a risk factor for several types of adjustment problems and early adolescent onset disorder. Body dissatisfaction has been a prospective predictor of depression, drive for thinness, eating disorders, body dysmorphia, low self-esteem, and health-compromising behaviours such as dieting and steroid use.

Emotional problem-

Adolescents experience more extreme, intense, and fleeting emotions and are less happy in general compared to adults, due to changes arising from hormones and brain development. Biological and social/cultural influences on emotions and their regulation. Healthy emotional development is strongly tied to adolescents' well-being, as well as to their risk for developing various behavioural internalizing and externalizing emotional disorders.

Adolescence is the age of freedom and independence. Adolescence is the age of experiencing stress particularly academic stress and day-to-day challenges of school/college life. It is the time when adolescents try to determine their academic goals and careers. This process involves many challenges which they have to face such as preparing for examinations or competitive examinations for better scores. Stress is inevitable in such conditions and therefore, the perception of stress and the coping abilities of students may lead to emotional problems, that finally affect their scholastic performance.

All over the developed and developing world, the fastest growing professions are demands for specific skills rather than reading and writing skills. Before leaving school, the adolescents of today must acquire sophisticated skills to be successful in the employment market and their social lives. In colleges, universities, and workplaces they are expected to learn from different sources and acquire these skills. Over the past several decades, social skills training has become some of the most widely practiced techniques in clinical psychology, with applications spanning a broad range of children, adolescent, and adult disorders.

Bellack and Hersen (1979) offer one of the most

comprehensive descriptions of social skills as the ability to express both positive and negative feelings in the interpersonal context without suffering consequent loss of reinforcement. Social skill is demonstrated in a large variety of interpersonal contexts and involves the coordinated delivery of appropriate verbal and nonverbal responses.

History of social skill training-

In the 1940s, Salter (1949) engaged individuals in role-plays to facilitate self-expression and to help them overcome depression and anxiety.

In the 1950s, Wolpe incorporated role-playing into his approach to psychotherapy based on reciprocal inhibition. Role-playing was used to help clients develop more assertive interpersonal skills.

In the 1960s, Bandura's (1969) work on observational learning led to the formal inclusion of role modeling as a critical ingredient in social skills training. Lazarus (1996) introduced the use of repeated role-plays paired with instructions to facilitate the behavior-shaping approach employed in social skills training.

O'Donohue and Krasner (1995) major contribution to the development of skills training has played a prominent role in the emergence of behaviour therapy, behaviourism, instrumental and classical conditioning, social role learning, and finally social learning theory, which assumed that deviant or maladaptive behaviour is learned, rather than being the product of a disease. Social skill training is used as an intervention designed to unlearn such behaviours or to teach more adaptive behaviour.

By the 1970s, social skills training most widely practiced clinical technique in individual, group, and family psychotherapy. Social skill training is not only in clinical population but is also widely applied in nonclinical populations such as working place, with maritally distressed couples (Gottman & Rushe, 1995), training parenting skills (Forehand & McMahon, 1981), and teaching employment skills (Berg, Wacker, & Flynn, 1990).

Social skills may be defined as socially acceptable learned

behaviours that enable a person to interact with others in ways that elicit positive responses and to avoid negative responses

Two different models have been intensively used in literature to understand the concept of social skills (1) the stress vulnerability coping skills model and (2) the social skills model

Stress vulnerability coping skills-

This model provides a general framework for understanding the interactions between psychobiological vulnerability, psychosocial stress, and coping skills in determining the severity and course of psychiatric illnesses (Nuechterlein & Dawson,1984; Zubin & Spring, 1977).

According to this model, psychobiological vulnerability is necessary for the development of a psychiatric illness. It is determined relatively early in life by factors such as genetic loading and early environmental contributions.

Stress is defined as any environmental change or set of contingencies that require adaptation to minimize noxious effects such as the loss of support from a significant other, living in a stressful home environment, or stressful life events. Stress interacts with psychobiological vulnerability, increasing the chances of either developing a psychiatric disorder, precipitating the occurrence of previously dormant symptoms in an individual who already has a psychiatric illness, or worsening symptoms in a currently symptomatic individual.

The negative effects of stress on vulnerability can be minimized in three ways. (1) By modifying the environment in which they live (2) taught stress management skills for minimizing the noxious effects of stress (3) taught social and problem-solving skills to decrease the effect of stressors.

Coping skills are those abilities that enable an individual to buffer the negative effects of stress on psychobiological vulnerability. Coping skills operate by either eliminating the source of stress or by decreasing the unpleasant effects (Lazarus & Folkman, 1984). Social skills and problem-solving skills are examples of coping skills. To sum up, the stress vulnerability coping

model addresses the relationship between social, and problem-solving skills, the severity, and the course of the severity of maladaptive behaviour.

The social skills model –

This model addresses the relationship between social and problem-solving skills on the one hand and social competence and social adjustment on the other (Bellack, Mueser, Gingerich, & Agresta, 1997). Social competence is defined as the ability to achieve desired goals. Social adjustment refers to an individual's actual attainment of those goals, including the ability to function in different social roles (e.g., worker, parent, spouse, student), to enjoy leisure and recreational activities, and to care for oneself (Mueser, Bellack, Morrison, & Wixted, 1990).

Assumption of social skill model-

1. social competence requires the integration of a set of component behaviors
2. impairments in component skills contribute to poor social competence
3. social skills are learned or are learnable social skills are not the only determinant of social functioning; a wide range of other factors may also influence social adjustment. skills are considered to be critical ingredients for interpersonal success, and deficits in these skills can be rectified through skills training techniques.
4. stress vulnerability model addresses the interface between skills and psychiatric illness, the social skills model is aimed at explaining the relationships between skills, social functioning, and goal attainment.

Objective of social skills training

1. promoting social skills acquisition
2. enhancing social skills performance
3. reducing or removing interfering problem behaviours
4. facilitating the generalization and maintenance of social skills

Components of behavioural skills

Nonverbal	Paralinguistic	Verbal	Interactive balance
Eye contact	Loudness	Verbal content	Smoothness of turn taking
Use of gestures	Tone	Verbal message	Use of social reinforcer
Facial expression	Pitch	Choice of wording	Balance of time taking
Posture	affect	Appropr-iateness of Self disclosure	
Body orientation	Rate of speech		
Interpersonal distance	Clarity of speech Duration of utterance		

Numerous research studies have documented that these four skills nonverbal, paralinguistic, verbal, and interactive balance, are less effective in clinical populations than in nonclinical populations. These skills are positively correlated with social functioning.

Training Techniques-

There are two basic models commonly used to train social skills, the *motor skills model* and the *problem-solving model*.

Motor skills model-

The primary focus of this model is on training the specific component skills necessary for successful interactions through repetition and programming the generalization of skills to a variety of real-life situations. The fundamental assumption of this model is that overlearning specific behavioural skills through practice in both simulated (role play) and real social situations will result in

these skills becoming automatic in relevant situations.

The problem-solving model-

According to this model, the generalization of social skills to novel situations requires cognitive or problem-solving skills to be maximally effective. The basic philosophy of this model is that if clients can systematically apply problem-solving skills to formulate goals and deal with obstacles or problems in social situations, their social competence will be improved. Thus, this model incorporates a motor skill model along with problem-solving training to improve the generalization of social skills to novel situations, to enable clients to overcome potential obstacles to achieving goals and to develop alternative strategies when initial ones fail.

Common principle-

Both models of motor skills and problem-solving are based on learning principles- *instrumental (or operant), observational (to train new social skills), modeling, and verbal reinforcement. Shaping* refers to the reinforcement of successive approximations to a goal. Social skills require the complex integration of many component skills that are discussed above in a detailed manner.

To encourage clients to keep trying, and to recognize their progress in acquiring targeted component skills, behaviour needs to be shaped gradually over time by providing ample reinforcement. *Generalization* is the ability to transfer a skill learned in one setting to another situation.

Clients must be able to use the skills acquired in training sessions in real-life settings. Therefore, the generalization of skills to clients' natural living environments is an integral part of social skills training. Some generalization trips for clients such as practicing skills on their own, doing homework assignments, and teaching significant others.

Advantages-

1. obvious advantage of economy, considering that one or two therapists can work with five to eight clients simultaneously in a group setting.

2. group-based skills training provides clients with a variety of different role models, which may facilitate their acquisition of targeted skills.

3. feedback from other clients can be obtained in a group format, providing additional reinforcement for clients to practice the requisite skills.

4. group-based skills training can provide the opportunity for role-playing with a variety of different partners, a task that is much more difficult to accomplish when conducting individual psychotherapy.

5. clients often appreciate the opportunity to work with others who share similar difficulties and goals.

Family Format-behavioural family therapy involves teaching basic communication skills in which families are taught four basic communication skills (active listening, expressing positive feelings, making positive requests, expressing negative feelings). Families are given homework assignments to practice these skills on their own. Role-plays are used to assess family members' acquisition of targeted skills.

CONCLUSION-

Schneider and Byrne, who conducted the first major meta-analysis of social skills training studies in 1985, reported social skills interventions were more effective for preschoolers and adolescents than elementary children. In a 2001 meta-analysis of social skills training with antisocial and aggressive youths, Ang and Hughes found a moderate effect size for the skills training intervention. Interestingly, group composition appeared to mediate the effectiveness of the intervention. Intervention groups that were composed of deviant youth and their prosocial peers had higher effectiveness than did intervention groups composed only of deviant youth.

Social skills training helps to describes and treatment of common adolescent problem such as anxiety, sadness, and impulsivity overt behavioural problem verbal or physical aggression, excessive movement responses. interpersonal issues,

dating anxiety, poor assertiveness, conflict resolution, dealing with social anxiety, substance abuse to specific clinical diagnoses major depression, borderline personality disorder, and social phobia

All above describe problem major issues is skill deficit, thus, with social skills acquisition the intervention objectives are to teach and increase the frequency of prosocial behaviours while concurrently decreasing or eliminating interfering problem behaviours.

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INDIA'S COMMITMENT AND ACHIEVEMENT IN SUSTAINABLE DEVELOPMENT GOALS

Deepmala Singh
Assistant Professor, Department of Botany, Government Raza PG College, Rampur- UP, dr.dsingh7@gmailcom

ABSTRACT

Industrialization and unplanned urbanization caused an imbalance in economic, society and environment. Its harmful impact on nature and humankind is already started to visible, which really worried all the world leaders, that's why a concept of Sustainable development arise. To address these challenges the agenda of 'Transform our world' came in existence in the form of sustainable developmental goals (SDG) for all the countries. Despite of largely populated nation, Indian government took some serious steps towards fulfilling these SDGs like 'Beti Bachao Beti Padhao Mission', 'Swachh Bharat Mission', 'open defecation- free' mission and 'Har Ghar Jal mission', etc. Here only SDG 3, 4, 5 and 6 are discussed. However, progress in other SDGs also reported in different literature. This is only a glimpse towards achieving SDGs and the efforts of people and government together. Now India is transforming into New and better India day by day.

Key words: sustainable development, environment, SDGs, India.

INTRODUCTION

From the ancient time developmental goals for any society focused primarily on human growth. Therefore, humans utilized resources according to their need. Nature provide everything that we needed but not for exploitation. Increasing population, unplanned urbanization and industrialization caused excessive use of natural resources without paying attention that they are depleting fast. Consequently balance between environment and society disturbed alarmingly. This demand an global action plan to sustain development efficiently and environmentally safe. So there is a need of sustainable growth which may provide proper solutions and tools to restore harmony among economic, environment and society, i.e. growth without compromising future- nature, -generations and their needs (Emas, 2015). The Brundtland

commission report (1987) had emphasized the importance of sustainable development. Sustainable development (SD) means a growth and development of society with judicial resource use. So that future generation can also have their part of natural resources.

Global call/SDGs

'Transform our world'- with this aim Sustainable Development Goals (SDGs) came in existence in 2015 as a part of UN agenda 2030, to address world's most urgent environmental, economic and social challenges. Agenda 21 mostly emphasis on participation of all for implementation and success to achieve SDGs.

SDGs are a call to action to end poverty and inequality, protect the planet, and ensure that all people enjoy health, justice and prosperity. SDGs provide a framework for countries to work together in achieving a better and safer world for all. The idea of working in harmony is the only way to reach these goals and enjoy more secure future together (SDGs, 2017; Swain and Ranganathan, 2021). Therefore it is suggested that every country much includes following 17 SDGs in their nation growth plan- (1) no poverty, (2) zero hunger, (3) good health and well-being, (4) quality education, (5) gender equality, (6) clean water and sanitation, (7) affordable and clean energy, (8) decent work and economic growth, (9) industry, innovation and infrastructure, (10) reduce inequality, (11) sustainable cities and communities, (12) responsible consumption and production, (13) climate action, (14) life below water, (15) life on land, (16) peace, justice and strong institutions (17) partnerships for the goals.

Challenges and Achievements so far

India is a fast pace developing country which works continuously with more than one and half billion population. So definitely it is not an easy simple task in providing resilient infrastructure, promote ideas and innovations, providing good health, education and equal opportunity for all. Main challenges are societal issues such as gender inequality, sociocultural disparity along with education, opportunities, wages and sanitation (Smith et al., 2014).

Despite of many challenges India is taking successful steps towards many SDGs, such as to promote quality education SGD 4. Stop female foeticide and promote girl child education under Beti Bachao Beti Padhao mission 2015, hence advancing in gender equality also (SDG 5).

SDG 3 and 6 addressed under the Swachh Bharat Abhiyan and 'open defecation- free' mission, more than 100 million toilets were constructed nationwide. In 2019 Indian Government announced open-defecation free status for country. This is a remarkable achievement in stepping towards fulfilling SDGs (UNICEF 2018; Hutton et al. 2020). Massive cleaning program launched across the country under Swachh Bharat Abhiyan, caused awareness among citizens regarding importance of cleanliness. 'Har Ghar Jal' programme under the Jal Jeevan Mission (JJM) launched for water sector in 2019 and expected to provide access to clean water through functional tap water connections, is an another remarkable step.

CONCLUSION

Although it's a long step to go but slowly and steadily India is stepping towards achieving its goals of sustainable development. As mentioned earlier that it is a country of a huge population so definitely ensuring 'Safe environment' for everyone and providing required infrastructure for growth and development is not going to happen overnight but a steady progress is definitely evident from the above mentioned government plans. People participation, government effort and NGOs together will surely help this happen. We are about to witness a new and better India in near future.

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NATION BUILDING AND INTEGRATION OF INDIA (AN HISTORICAL OVERVIEW)

Dinesh Singh
Assistant Professor Dept. of History, V.R.A.L. Government Girls Degree College Bareilly, UP, E-mail: drdineshhistory@gmail.com

ABSTRACT

If you are curious about the concept of national integration, it refers to the unity among a country's citizens regardless of their religion, caste, gender, creed, or economic status. Essentially, national integration embodies a sense of oneness and brotherhood in a nation characterized by great diversity. Despite cultural, linguistic, and occupational differences, national integration binds the country together and strengthens it. It is crucial for the populace to understand what national integration means because nations that adhere to this principle tend to develop and thrive. Prior to its independence in 1947, India (known as the Indian Empire) was split into two categories of territories: one directly governed by Britain (British India), and the other comprising princely states that were under British Crown suzerainty. The internal governance of these princely states remained largely with their hereditary rulers, albeit to varying extents. It encompassed 562 princely states that had various revenue-sharing arrangements with the British, often based on their size, population, and local conditions. Moreover, there existed various colonial enclaves under the control of France and Portugal. Post-independence, the Indian National Congress declared the political integration of these territories into an Indian Union as a goal, and the Government of India worked towards this aim in the following ten years. Consequently, India was gradually unified. Jawaharlal Nehru and Vallabhbhai Patel led an expansionist movement that involved the forceful annexation and diplomatic incorporation of numerous princely states, culminating in the formation of present day India.

Key Words: National Integration, Nation Building, Diversity, Religion, Economy, National movement

INTRODUCTION

The processes of nation-building and integration in India

are notable for their complexity and significance. After gaining independence in 1947 and leaving behind colonial rule, India confronted the formidable task of uniting its diverse population, which comprised various religions, languages, cultures, and ethnic groups. This historical overview examines the significant events, strategies, and challenges that shaped India's journey toward national unity and integration.

The Context of India's Independence

Colonial Legacy: Over two centuries of British colonial rule left India with a fractured society, economic inequality, and deeply entrenched divisions based on religion, caste, and region. The administrative and infrastructural setup created by the British served as both a foundation and a challenge for post-independence nation-building. Partition of 1947: The partition of British India into India and Pakistan resulted in massive communal violence, the displacement of millions, and a lasting legacy of mistrust between communities. This event highlighted the urgent need for national integration and the healing of divisions.

Vision for Nation Building

Constitution of India (1950): The framing of the Indian Constitution was central to nation-building. It established India as a secular, democratic republic, emphasizing justice, equality, liberty, and fraternity. Fundamental Rights and Directive Principles aimed to protect diversity while fostering unity. Leadership of Jawaharlal Nehru: As India's first Prime Minister, Nehru envisioned a pluralistic and modern India. His policies emphasized secularism, socialism, and industrial development to bind the nation together.

Political and Territorial Integration

Integration of Princely States: At the time of independence, India consisted of over 560 princely states, which were semi-autonomous under British rule. Sardar Vallabhbhai Patel's Role: As India's first Home Minister, Patel played a pivotal role in unifying these states. Through diplomacy and, in some cases, force (e.g., Hyderabad and Junagadh), he ensured that these territories joined the Indian Union. Jammu and Kashmir: The integration of Jammu and Kashmir was particularly challenging due to its

strategic location, religious composition, and the Indo-Pakistani conflict. The accession of the state to India in 1947 remains a sensitive issue.

Linguistic Reorganization of States

In 1956, India underwent a major reorganization of its states along linguistic lines, following the recommendations of the States Reorganization Commission. This move helped address regional aspirations and linguistic identities while maintaining national unity. Despite some initial resistance, such as the violent agitation in Andhra Pradesh for a Telugu-speaking state, this strategy reduced tensions and fostered integration.

Socio-Cultural Integration

Promotion of Secularism: India's secular framework aimed to ensure equality among all religions and foster communal harmony. Leaders like Mahatma Gandhi emphasized nonviolence and unity among Hindus, Muslims, Sikhs, and other communities. National Symbols: The adoption of a national flag, anthem ("Jana Gana Mana"), and emblem reinforced a shared sense of identity. Education and Language Policy: Efforts were made to promote Hindi as a link language while preserving regional languages. English also served as a unifying medium, especially in administration and higher education.

Economic Development as a Unifying Force

Five-Year Plans: Economic planning was seen as a tool for reducing regional disparities and fostering integration. Infrastructure Development: Projects like the construction of dams, railways, and industrial hubs connected different regions and created interdependence. Green Revolution: Though initially limited to certain regions, agricultural advancements helped stabilize food security and reduce rural-urban divides.

Challenges to Nation Building and Integration

Communal Violence: The partition riots of 1947, the 1984 anti-Sikh riots, and other incidents of communal violence have periodically tested India's unity. Caste and Social Inequalities: Deep-rooted caste divisions have been a major obstacle to social

integration, necessitating affirmative action and social reforms. Regional Movements: Movements like the Dravidian movement in Tamil Nadu, demands for statehood (e.g., Telangana), and insurgencies in the Northeast posed challenges to national integration. Secessionist Movements: Insurgencies in Jammu and Kashmir, Punjab (Khalistan movement), and the Northeast reflected discontent among specific regions and communities.

Strategies for Resolving Challenges

Democratic Framework: India's democracy provided a platform for addressing grievances through dialogue and representation. Federalism: The Indian federal system allowed regional autonomy while maintaining national unity. Cultural Pluralism: Celebrating diversity through festivals, literature, cinema, and arts strengthened cultural integration. Armed Forces and National Service: The Indian Army, a symbol of national unity, played a crucial role in maintaining territorial integrity and responding to crises.

Successes and Ongoing Efforts

Unity in Diversity: India has emerged as a stable democracy despite its immense diversity. Global Recognition: India's peaceful coexistence of multiple cultures, languages, and religions is often cited as a model for pluralism. Ongoing Challenges: Issues like religious polarization, regional disparities, and linguistic conflicts require continuous attention and policy innovation.

CONCLUSION

The process of nation-building and integration in India stands as a testament to the vision and resilience of its leaders and citizens. In spite of its difficulties, India has managed to maintain its democratic structure and honor its diversity. The integration process continues to evolve, mirroring the dynamic nature of Indian society. The Indian experience highlights how crucial inclusive governance, cultural pluralism, and economic development are for national unity.

SUSTAINABLE DEVELOPMENT GOALS (SDG): CENTRAL SCHEMES TO ACHIEVE 17 GOALS

Vijay Kumar
*Government Degree College Babrala–Gunnaur, Sambhal UP

ABSTRACT:

An ancient Indian phrase Vasudhaiva Kutunbakam, meaning "the world is one family", pithily captures the spirit of India's approach to all aspects of life including economic development. India as a developing and fast growing economy has played an important role in shaping the Sustainable Development Goals (SDGs). This has meant that the country's national development goals are mirrored in the SDGs. According to India's initiatives towards achieving SDGs, the country's Parliament has organized several forums to develop policy and action perspectives on elimination of poverty, promoting gender equality, addressing climate change and different schemes launched by central government to achieve 17 SDGs are briefly highlighted in the article.

Key words: SDGs, UN report, Sustainable development

According to the United Nations report-2022 on Sustainable Development Goals (SDG) UN establishes 17 SDGs to improve our world and India's initiatives are highlighted below-

Goal 1: No Poverty: End Poverty in All its Forms Everywhere- In order to achieve the goal following are announced by the government of India- 1) National Urban Livelihood Mission (Core) 2) National Rural Employment Guarantee Scheme 3) National Rural Livelihood Mission (Core) 4) National Social Assistance Programme (Core of the Core) 5) National Land Record Management Programme.

Goal 2: Zero Hunger: End hunger, achieve food security and improved nutrition and promote sustainable agriculture- In order to overcome the serious problem of hunger, government of India started- 1) National Food Security Mission (Core) 2) Mission for integrated Development of Horticulture 3) National Mission

on Sustainable Agriculture 4) National Oilseed and Oil Palm Mission 5) National Mission on Agriculture Extension and Technology 6) Rashtriya Krishi Vikas Yojana (Core) 07) National Livestock Mission (Core) 08) Livestock Health and Disease Control (Core) 09) National Programme for Bovine Breeding and Dairy Development.

Goal 3: Good Health and wellbeing: Ensure healthy lives and promote wellbeing for all at all ages- Government of India is providing and ensuring healthy lives by these schemes- 01) National Health Mission including NRHM (Core) 02) Human Resource in Health and Medical Education (Core) 03) National Mission on Ayush including Mission on Medical Plants (Core) 04) National AIDS &STD Control Programme 05) Integrated Child Development Service (ICDS) (Core).

Goal 4: Quality Education: ensure inclusive and equitable quality education and promote lifelong learning opportunities for all- 01) Sarva Shiksha Abhiyan (Core) 02) National Programme Nutritional Support to Primary Education (MDM) (Core) 03) Rashtriya Madhyamik Shiksha Abhiyan (RMSA) (Core) 04) Support for Educational Development including Teachers Training & Adult Education (Core) 05) Scheme for providing education to Madrasas, Minorities and Disabled (Core of the Core) 06) Rashtriya Uchhtar Shiksha Abhiyan (RUSA). All these schemes are creating a big change in the society.

Goal 5: Gender Equality: Achieve gender equality and empower all women and girls- Dr. B R Ambedkar mentioned in his autobiography, if you want judge the progress of the country, just check the involvement of women in the development of the country. Government of India is trying to increase the participation of women in the development of country- 01) National Mission for Empowerment of Women including Indira Gandhi Mattritav Sahyog Yojana (Core) 02) Rajiv Gandhi Scheme for Empowerment of Adolescent Girls (SABLA) (Core) 03) National Rural Drinking water Programme (Core) 04) Nirmal Bharat Abhiyan (Core) 05) Pradhan Mantri Krishi Sinchayee Yojana 06) National River Conservation Programme (NRCP) 07) National Service Scheme (NSS) 08) Skill Development Mission 09) Social Security for Unorganised Workers including Rashtriya Swastya bima yojana.

Goal 6: Clean water and Sanitation: One in three people live without sanitation-

1) Jal Jeevan Mission 2024 is being implemented by central government in partnership with States, to enable every household in villages to have functional household tap connection by 2024. 2) Swachh Bharat Mission launched on 2nd October 2014. To accelerate the efforts to achieve universal sanitation coverage and to put the focus on sanitation.

Goal 7: Affordable and clean energy: ensure access to affordable, reliable, sustainable and modern energy for all- Ministry of New and Renewable energy, in order to ensure access to affordable, reliable, sustainable and modern energy for all launched 1) Scheme for "Development of Solar Parks and Ultra Mega Solar Power Projects"

Goal 8: Descent work and economic growth: promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.

Goal 9: Industry, Innovation and infrastructure: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation- 01) Border Area Development Programme (BADP) (ACA) (MHA/M/o Finance) 02) National Handloom Development Programme 03) Catalytic Development Programme under Sericulture 38) Pradhan Mantri Gram Sadak Yojana (PMGSY) (Core).

Goal 10: Reduced inequality: Too much of the world's wealth is held by a very small group of people. This often leads to financial and social discrimination. In order for nations to flourish, equality and prosperity must be available to everyone –01) Multi Sectoral Development Programme for Minorities 02) Backward Regions Grant Fund (District Component) (ACA) (M/o PR/M/o Finance) 03) Scheme for Development of Scheduled Castes (Core of the Core) 04) Scheme for Development of Other Backward Classes and Denotified, Nomadic and Semi-nomadic Tribes. (Core of the Core) 05) Scheme for development of Economically Backward Classes (EBCs) 06) Umbrella scheme for Education of ST students (Core of the Core) 07) Backward Regions Grant Fund (BRGF) (State Component) (ACA).

Goal 11: Sustainable cities and communities: The world's population is constantly increasing. To accommodate everyone, we need to build modern, sustainable cities- 01) Rajiv Awas Yojana (including BSUP & IHSDP) 02) Indira Awas Yojana (IAY) 03) Pradhan Mantri Adarsh Gram Yojana (PMAGY) 04) National Programme for Persons with Disabilities 05) Jawaharlal Nehru National Urban Renewal Mission (JNNURM) (ACA).

Goal 12: Responsible Consumption and Production: According to the UNEP 2021 report, about 50 kg of food is wasted per person per year in India. According to the Central Pollution Control Board (CPCB), India generates close to 26,000 tonnes of plastic a day and over 10,000 tons a day of plastic waste remains uncollected.

Goal 13: Climate Action: Climate change is a real and undeniable threat to our entire civilization-

Goal 14: Life Below Water: conserve and sustainably use the oceans, seas and marine resources for sustainable development- 01) Conservation of Natural Resources and Ecosystems

Goal 15: Life and Land: conserve and sustainably use the oceans, seas and marine resources for sustainable development- 01) National Afforestation Programme (National Mission for a Green India) (Core) 02) Integrated Development of Wild Life Habitats (Core) 03) Project Tiger (Core).

Goal 16: Pease justice and strong institutions: promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels- 01) Panchayat Yuva Krida aur Khel Abhiyan (PYKKA) 02) Development of Infrastructure Facilities for Judiciary including Gram Nyayalayas (Core) 03) Integrated Child Protection Scheme (ICPS) (Core).

Goal 17: Partnerships for goals: strengthen the means of implementation and revitalize the global partnership for sustainable development- 01) Support for Statistical Strengthening.

So it is the responsibility of every individual and every nation to participate in achieving the Global Goals to make this world better place for the coming generations.

THE ROLE OF WOMEN IN THE INDIAN FREEDOM STRUGGLE

Umme Habiba Mujaddadi*, Tayyaba Mujaddadi, Maleeha Khan and Baby Tabassum
Department of Zoology, Govt. Raza P.G. College, Rampur, U.P.

ABSTRACT:

Without acknowledging the efforts of women, the history of the Indian struggle would be incomplete. The sacrifices made by Indian Women will take centre stage. To gain our independence, the women had played a crucial role. From protests and demonstrations to revolutionary movements and social reform, women's participation was multifaceted and far – reaching. Through their participation in organizations like the Indian National Congress and the All India Women's conference, women challenged traditional gender roles. Women took the lead in the fight when the majority of the male freedom fighters were imprisoned. Therefore, it is commendable that women participated in the freedom struggle and national awakening. This paper aims to acknowledge the courage, resilience and determination of Indian women who challenged colonial oppression and social norms to contribute to their country's freedom. Their stories serve as a testament to the power of women's participation in shaping India's history and continue to inspire future generations.

Keywords: Indian Freedom Struggle, women's contributions, nationalist movement, social reform, women's empowerment.

INTRODUCTION:

In honour of the country's liberation and advancement, "Meri Maati Mera Desh" aspires to a collective celebration of India's land and bravery. The "Meri Maati Mera Desh" campaign serves as a reminder that it is our duty to pay tribute to our great freedom fighters and soldiers whose constant hard work and sacrifice bought us freedom. It is also our responsibility to safeguard and preserve the land that has given us the water sources that keep us alive, the fertile land that feeds us and the landscapes that inspires us. The Indian Freedom Struggle was a pivotal moment

in the country's history, marked by widespread protests, demonstrations, and revolutionary movements. While the contributions of prominent male leaders have been extensively documented, the pivotal role of women in this movement remains relatively unexplored.

Rani Lakshmi Bai battle for the Nations Independence. Bhima Bai Holkar battles against the British in early 1817 mark the beginning of women's involvement in India's Independence movement. The first Indian woman socialist to fight for the independence of a nation following the 1857 Revolt was Madam Bhikaji Cama. In addition to being crucial in determining the course of the Independence movement, women's contributions were also crucial in altering social norms and gender roles.

Pioneers of the Freedom Struggle:

Several women played an important role in shaping the Freedom movement. Some examples include:

- **Begum Hazrat Mahal:** She led the Indian Rebellion of 1857 in Awadh, fighting against British rule.
- **Rani Lakshmi Bai:** The fearless Queen of Jhansi, played an essential role in the Indian Freedom Struggle.
- **Qudsiya Begum:** Freedom Fighter and social worker, who participated in the Indian Independence movement.
- **Sarojini Naidu:** A renowned poet, politician, and women's rights activist, who worked with Mahatma Gandhi and Jawaharlal Nehru.
- **Nawab Sultan Jahan Begum:** Last ruling Begum of Bhopal, she was a pioneer of Women's education and healthcare in India.
- **Kamaladevi Chattopadhyay:** A social reformer, feminist, and freedom fighter, who co – founded the Indian Cooperative Union and worked tirelessly for women's empowerment.

Early Beginnings: Women in the 1857 Rebellion

The Indian Rebellion of 1857 commenced the women's participation in freedom struggle. Rani Lakshmi Bai, Begum Hazrat

Mahal and Rani Avantibai were among the prominent female leaders who played a key role in rebellion. Their bravery and strategic leadership inspired countless others to join the fight.

Women's Participation in the Non – Cooperation Movement:

This Movement was launched by Mahatma Gandhi in 1920 saw widespread participation from women. Women like Kamaladevi Chattopadhyay, Kasturba Gandhi and Mithuben Petit played key roles in organizing protests, demonstrations, and boycotts.

Women in the Indian National Congress:

Indian National Congress, initiated in year 1885, provided a platform for women to take part in freedom struggle. Sarojini Naidu, Kamaladevi Chattopadhyay and Annie Besant were among the prominent female members who held key positions and influenced policy and strategy. They worked tirelessly to mobilize women, organize protests, and raise funds for the movement.

Women's Role in the Quit India Movement:

This Movement (1942) marked a turning point in freedom struggle. Women played a pivotal role in organizing protests, demonstrations and underground activities. Many women, including Aruna Asaf Ali and Usha Mehta worked with Mahatma Gandhi and others to coordinate the movement.

Women in Revolutionary Movements:

Women like Lakshmi Saghal, Durga Bhabhi, and Janaki Thevar participated in revolutionary movements like the Indian National Army (INA) and Revolutionary Socialist Party.

Women's Organizations and Social Reform:

Women's organizations like the All-India Women's Conference (AIWC) and the Women's Indian Association (WIA) played a significant part in advocating for social reform and women's empowerment. These organizations worked towards promoting women's education, healthcare, and economic empowerment.

CONCLUSION:

Women's contribution in Indian Freedom Struggle was determining with women participating in protests, demonstrations and revolutionary movements. Through their participation in various organizations like the Indian National Congress, women challenged traditional gender roles and advocated for social reform. Their contributions were instrumental in shaping the movement and ultimately achieving independence. Women's contributions have paved the way for increased representation of women in politics, social reform, and nationalist movements. Their bravery, sacrifice, and perseverance serve as a testament to the power of Women's involvement in shaping the course of nations.

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ROLE OF URBAN LOCAL-SELF GOVERNMENT FOR THE EMPOWERMENT OF WOMEN: A STUDY OF ALIGARH MUNICIPAL CORPORATION

Farhan[1] Abedi and Ana Anjum[2]
[1]Assistant Professor, Department of Sociology, [2]Assistant Professor, Department of English, Mohammad Ali Jauhar University, Rampur, U.P.

ABSTRACT

Inequality in relations between men and women is worldwide but its extent varies from society to society. Different societies evaluate the characteristics of men and women differently and these become part of customs and belief. Therefore, women become a social and not a biological category. The status of women their rights and duties are unequal and subordinate in relation to men. They have fewer social and economic rights over basic necessities as food, health care and education. It implies that men not only have and can exercise greater power than women in almost all spheres of life but they also have culturally and often legally sanctioned power over women.

The 74th amendment of the constitution provided for one third reservation of seats for women in urban local bodies. It heralded a new chapter for women empowerment by ensuring the representation of a large number of women in urban local bodies. This representation of women will be real and effective only if they are empowered- socially, politically and psychologically. So, in this paper researcher tries to study the empowerment of women members of urban local bodies to find out the extent to which they are empowered in terms of the above three dimensions.

Keywords: Women Empowerment, Urban Local Bodies, Social, Political, Economic.

INTRODUCTION

Inequality in relations between men and women is worldwide but its extent varies from society to society. Different societies evaluate the characteristics of men and women differently

and these become part of customs and belief. Therefore, women become a social and not a biological category. The status of women their rights and duties are unequal and subordinate in relation to men. They have fewer social and economic rights over basic necessities as food, health care and education. It implies that men not only have and can exercise greater power than women in almost all spheres of life but they also have culturally and often legally sanctioned power over women. The concept of women empowerment is relevant in this context. According to Chugh (2004, p. 35) "Empowerment implies that women have the power and authority to influence the decision making may it be home, institutions or the political bodies. According to Beteille (1999, p. 591), "The main point behind empowerment is that it seeks to change society through a re-arrangement of power". The analysis of above definition indicates that empowerment refers to getting power leading to change in power relation and it is a multi faceted processes which has three dimensions social dimension referring to having awareness and information about the institutions of change, political dimension which refers to the capacity to effectively engage in decision making processes and participating in collective decision making and psychological dimension which refers to confidence in one's abilities.

The 74th amendment of the constitution provided for one third reservation of seats for women in urban local bodies. It heralded a new chapter for women empowerment by ensuring the representation of a large number of women in urban local bodies. This representation of women will be real and effective only if they are empowered- socially, politically and psychologically. So, in this paper researcher tries to study the empowerment of women members of urban local bodies to find out the extent to which they are empowered in terms of the above three dimensions.

RESEARCH DESIGN

Research design is a plan that details different procedures and methods to be followed during the research. In the words of Seltizz, Jahoda and Cook "A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure". Every research has a different purpose and objectives

so research design also cannot be uniform and it must be according to research purpose. This study of Empowerment of Women through Urban Local Government was carried out among 70 ward members of the Aligarh Municipal Corporation in which there were 24 women ward members and a sample of 8 women was selected randomly(1/3 of the total elected members) and the case study method was adopted for an in-depth study using an open ended interview schedule.

INTERPRETATION OF THE CASE STUDIES

The case studies of 8 women ward members of Municipal Corporation revealed that 6 women were passive in Corporation work and so not empowered. These women did not campaign from door to door and did not address any rallies and processions during election. They did not know anything about the Municipal Corporation activity as all work was done by their male relatives as their proxy and they just signed on the dotted line. They attended ward committee meetings accompanied with their male members. They never raised issues, put proposal and were not involved in any decision making. They considered themselves as dummy or name sake ward members. As far as development work was concerned in their ward, they did not know anything about it because their male relatives carried out the development work and answered all the questions. Nothing as such had changed in their life because before being elected as ward members they were busy in household chores and still were busy in same activity. They had no confidence to speak in public. People of their ward did not recognize them as a ward member because everyone knew their male relatives as ward members.

The case studies of 08 women ward members of Aligarh Municipal Corporation revealed that 02 were active in corporation work and so empowered. These women campaigned from door to door and addressed rallies and processions which were organised by the party. Initially they had problems in understanding corporation work because of lack of experience but they soon learned how to manage corporation activity. These women ward member did not feel any sort of hesitation while talking to higher officials. These women also attended ward committee meeting regularly and no one accompanied them and they put proposals,

raised issues and participated in decision making. They had done lot of developmental work in their ward and initiated a number of welfare measures and were able to answer questions put to them about it. They were also aware that one ward committee meeting was necessary in six months. People came to seek their advice for solving their problems. These women encouraged other women to come out of their home and to become aware of their rights and to participate in politics. They had more say in decision making within the families such as arranging marriages, education of children, buying and selling of property etc. They could speak confidently in public about women's right in order to make them aware and to enable them to participate in politics.

CONCLUSION

As we all know that Empowerment refers to getting power leading to change in power relation and had three dimensions (a) psychological empowerment, women ward members did not have confidence in their ability because they were passive in corporation work and their husbands did it on their behalf. (b) Social empowerment is concerned, they did not know anything about the municipal activity and they just signed on the dotted line. They attended ward committee meetings with their husbands and never raised issues, put proposal and were not involved in any decision making. (c) Political empowerment they were not politically empowered and were dummy or name sake ward members as their husbands worked as their proxy. Even the people in their area did not recognize them because everyone knew their husbands as ward members. All the women members were married and their husbands wanted to be ward members but when the seat was reserved for women, they persuaded their wives to contest the election. In this way, there was no women empowerment in the Aligarh Municipal Corporation in social, political or Psychological terms.

HERITAGE CONSERVATION EFFORTS

Tayyaba Mujaddadi*, Umme Habiba Mujaddadi, Tasmiya Khan and Baby Tabassum
Department of Zoology, Govt. Raza P.G. College, Rampur, U.P.

ABSTRACT:

Heritage conservation is crucial for preserving cultural identity, promoting tourism, and fostering economic development. Heritage Conservation is an interdisciplinary endeavor. As we journey through the complexities of modernization, it's essential to reflect on our cultural heritage and the efforts being made to conserve it. Heritage Conservation is a vital aspect of preserving cultural history, traditions, and identities. With one of the world's largest collections of historic buildings, India faces significant challenges in comprehending and safeguarding these structures against weathering, ageing and natural disasters due to a shortage of both sufficient quality and quantity of man power. Heritage sites, including monuments, buildings, and landscapes, are irreplaceable assets that require careful conservative. This paper discusses the heritage conservation efforts, with a focus on challenges and strategies.

Key words: Heritage conservation, cultural heritage, sustainable tourism, conservation efforts

INTRODUCTION

"Meti Maati Mera Desh" aims to commemorate India's path of liberation and advancement by promoting a united celebration of the country's land and bravery. This initiative will foster a sense of national pride and motivate future generations to preserve India's treasured legacy by fostering a connection with the land and paying tribute to our heroes. This will honors the country's numerous accomplishments. In August 2023, the Ministry Of Education culminated the "Meri Maati Mera Desh" program.

Conservation is defined as the process of preserving and enhancing a structure's or monument's cultural significance. Heritage is what we have left behind from the past, what we can use in our daily lives, and what we pass on to the next generation.

Resources from our natural and cultural past are invaluable sources of inspiration and life. They serve as our identities, touchstones, and points of reference. The legacy of tangible artefacts, cultural property, and intangible characteristics of a group or society that are passed down from previous generations, preserved in the present, and donated for the benefit of future generations is known as cultural heritage.

Perhaps the most extensive and varied collection of cultural and architectural legacy may be found on the Indian subcontinent, where a sizable percentage of the buildings are living monuments. Of the vast number of cultural structures in India, only 25 have been designated as World Cultural Monuments by UNESCO, while the Archeological Survey of India (ASI) has declared about 3,650 monuments that have been designated as monuments of national significance.

TYPES OF HERITAGE:

There are several types of heritage, including:

1. **Cultural Heritage:**

   It includes tangible and intangible aspects of culture, such as:

   - Monuments and buildings
   - Art and artifacts
   - Language and literature
   - Customs and traditions

2. **Natural Heritage:**

   It includes natural sites and landscapes, such as:

   - National parks and wildlife reserves
   - Mountains and forests
   - Rivers and lakes
   - Coastline and beaches
   - Geological formations and fossils

3.Tangible Heritage:

It includes physical objects and structures, such as:

- Monuments and memorials
- Artifacts and antiquities

4. Intangible Heritage:

It includes non physical aspects of culture, such as:

- Language and literature
- Customs and traditions
- Folklore and mythology

5. Industrial Heritage:

It includes sites and objects related industrial history, such as:

- Factories and mills
- Railways and canals

A. Importance of Heritage Conservation-

Heritage Conservation is essential for preserving cultural diversity, promoting cross- cultural understanding, and supporting local economies. Heritage sites provide a sense of identity, and continuity, linking past, present, and future generations. The importance of heritage conservation cannot be overstated, as it:

1. Preserve Cultural Identity:

Heritage Conservation helps preserve the cultural identity of communities, nations, and civilizations, allowing future generations to understand and appreciate their heritage.

2. Promotes Tourism:

Heritage sites and monuments can be significant tourist attractions.

3. Supports Education and Research:

Heritage conservation provides valuable opportunities for

education and research, allowing scholars, students, and the general public to learn from and engage with the past.

4. Protects Environmental and Natural Heritage:

Heritage conservation also encompasses the protection of natural heritage sites, such as national parks, wildlife reserves, and other areas of outstanding natural beauty.

5. Provides a Sense of Continuity and Belonging:

Heritage conservation helps to provide a sense of continuity and belonging, connecting people to their past, their culture, and their community.

6. Supports Sustainable Development:

Heritage conservation can contribute to sustainable development by promoting the reuse and adaptation of existing buildings, reducing waste, and conserving energy.

B. Threats to Heritage Sites-

Heritage sites face various threats, including climate change, urbanization, and human induced damage etc.

Challenges in Heritage Conservation:

1. Funding and Resource Constraints:

Limited financial resources and inadequate infrastructure hinder conservation efforts.

2. Balancing Preservation and Tourism:

The increasing demand for tourism can compromise the integrity of heritage sites.

3. Natural disaster and Climate change:

Climate change, humidity, frost, excessive rainfall, and floods can all damage cultural heritage sites.

4. Community Engagement and Participation:

The involvement of local communities in conservation efforts is crucial but often challenging.

5. Urbanization and Development:

Rapid urbanization and development projects often lead to destruction or degradation of heritage sites.

6. Vandalism and Theft:

Heritage sites are often targeted by vandals and thieves, who damage or steal valuable artifacts, compromising the integrity of these sites.

Heritage Safety Education in India-

Heritage safety education is crucial in India for preserving the country's vast and diverse cultural heritage. Heritage safety education initiatives in India aim to raise awareness among students, local communities, and tourists about the importance of preserving cultural heritage. Through workshops, training programs, and awareness campaigns, these initiatives promote the development of skills and knowledge necessary for responding to emergencies and disasters that may affect heritage sites.

Heritage Conservation Strategies:

Here are some effective heritage conservation strategies:

1. Community Engagement:

Involving local communities in conservation efforts their participation and ownership.

2. Sustainable Tourism Practices:

Promote sustainable tourism practices, such as responsible travel behaviors and eco friendly accommodations.

3. Traditional Conservational Techniques:

Use traditional conservation techniques, such as lime plastering and wood restoration, to preserve heritage sites.

4. Green Technologies:

Through incorporating green technologies, such ad solar panels and rainwater harvesting, into conservation efforts.

5. Heritage Education:

By integrating heritage education into school curricula to raise awareness and promote appreciation for heritage sites.

6. Public Awareness Campaigns:

By conducting public awareness campaigns to educate the public about the importance of heritage sites.

CONCLUSION:

Heritage conservation is crucial for preserving cultural heritage sites. Effective conservation requires a multi faceted approach, incorporating community engagement, sustainable tourism, management. By adopting a comprehensive and exclusive conservation strategy, we can ensure long term preservation of cultural heritage for future generations. In order to achieve the sustainability of these inheritances through a successful program of sustainable development, individuals must actively participate in maintaining their heritage, identity, awareness of its significance. Ultimately, heritage conservation is not just about preserving the past, it's about shaping a sustainable future that values and respects our cultural diversity.

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BIOMUSICOLOGY IN VEDIC CONTEXT

Neetu Singh[1*] and Dinesh C. Sharma[2]
[1]Asst. Prof., Dept. of Zoology, [2]Professor and Head of the Dept. of Zoology, Km. Mayawati Govt. Girls P.G. College, Badalpur (G. B. Nagar) U.P., [*]E-mail: neetuatri78@gmail.com

ABSTRACT

Biomusicology is a multidisciplinary field that investigates the connections between music, biology, and human well-being, shedding light on the ancient use of sound as a healing tool. In the Vedic tradition, sound is regarded as a vital force capable of influencing physical, mental, and spiritual health. Practices such as chanting, reciting mantras, and singing sacred hymns involve specific frequencies and vibrations that are believed to promote harmony within the body and mind. This chapter delves into the intersection of biomusicology and Vedic traditions, exploring the scientific basis of how sound, as described in Vedic literature, impacts human physiology and consciousness.

Blending ancient knowledge with modern scientific research, the chapter investigates the vibrational qualities of Vedic chants and their potential therapeutic benefits. Special attention is given to how rhythmic patterns in these chants relate to physiological metrics such as heart rate variability and brainwave activity. Additionally, the chapter examines the impact of Vedic sound practices on emotional well-being, stress management, and mental health. This analysis seeks to merge traditional sound-based healing methods with contemporary scientific perspectives, fostering new opportunities for integrating Vedic sound therapy into modern health and wellness practices.

The chapter concludes with a discussion on the future of biomusicology within the Vedic framework. Topics include the development of personalized sound therapies, the use of advanced technologies, and the potential for cross-cultural adoption of sound healing techniques. By studying Vedic sound practices through the lens of biomusicology, this work offers a holistic perspective on how these time-honored traditions can contribute to innovative approaches for achieving health, balance, and overall well-being.

INTRODUCTION

Biomusicology, an interdisciplinary field combining biology, music, and neuroscience, delves into how sound and music influence living systems at both physical and psychological levels. While contemporary science has been exploring these phenomena through advanced research, the ancient Indian Vedic tradition had already laid a deep foundation for understanding the transformative effects of sound thousands of years ago. The Vedas and Upanishads, regarded as the bedrock of Indian wisdom, hold profound insights into the healing and spiritual properties of sound, often transmitted through mantras, hymns, and meditative practices.

The Vedic worldview centers on the concept of *Nada*—a primordial vibration considered the essence of all creation. According to the ancient sages, sound was not merely a sensory experience but a dynamic force capable of influencing the physical, mental, and spiritual realms. This ancient understanding finds resonance with modern biomusicology, which investigates the role of sound in regulating biological rhythms, altering neural patterns, and supporting overall health.

Among the many treasures of the Vedic tradition are mantras, sacred arrangements of sounds designed to harness specific vibrational energies. A raga composition has two modes: alaap and gat. Alaap features a slow, free-flowing exploration of notes without a rhythmic cycle, while gat is faster and adheres to a rhythmic structure (Mathur, *et al*., 2015). These mantras were not only tools for spiritual elevation but also methods for achieving mental and physical harmony. Current research validates these practices, showing how repetitive chanting can lower stress, enhance focus, and promote emotional stability. Similarly, *Nada Yoga*, a discipline focusing on sound-based meditation, reflects the Vedic belief in sound as a harmonizing force connecting the mind, body, and spirit.

This chapter aims to bridge the ancient wisdom of the Vedas with the modern principles of biomusicology, highlighting their shared emphasis on the transformative power of sound. By exploring the physiological effects of Vedic chants, the neurological impacts of rhythmic patterns, and the holistic applications of sound

therapy, we uncover the timeless relevance of these practices. The insights drawn from this exploration not only illuminate the enduring significance of Vedic sound science but also offer innovative pathways to integrate this knowledge into contemporary therapeutic frameworks.

The Science of Sound in Vedic Literature

The Vedic Perspective on Sound: A Profound Exploration

Vedic literature presents a deep understanding of sound, emphasizing its essence and its impact on the universe and human life. Ancient Indian sages viewed sound as more than just an auditory phenomenon; they saw it as a vibrational force that forms the foundation of creation, sustains existence, and facilitates transformation. This philosophy, rooted in the spiritual and metaphysical teachings of the Vedas, resonates with modern scientific inquiries into the nature of sound and its effects.

1. Nada: The Primordial Vibration

- **Concept of Nada**: In the Vedic tradition, Nada signifies the primal sound vibration, regarded as the source of the cosmos. It is believed to bridge the physical and metaphysical realms, serving as the first manifestation of the unmanifested (Avyakta).
- **Om as the Supreme Nada**: The sacred syllable Om (Aum), described in the Upanishads, epitomizes Nada. It symbolizes the vibration from which the universe originates and the sound that sustains creation. The sound "OM" is thought to promote mental tranquility and relaxation. Research suggests that listening to the "OM" sound engages neural pathways associated with emotional empathy (Kumar, *et al*., 2015).
- **Nada Yoga**: This ancient practice involves using inner and outer sound to achieve spiritual alignment and self-realization, highlighting sound's ability to harmonize the body, mind, and soul.

2. Shruti and Swara: The Building Blocks of Sound

- **Shruti (Subtle Intervals)**: Shruti refers to the smallest perceptible unit of sound in Vedic musicology, forming the

foundation of musical scales. Ancient sages identified 22 Shrutis within an octave, representing intricate frequencies.

- **Swara (Musical Notes)**: Swara encompasses the seven fundamental musical notes (Sa, Re, Ga, Ma, Pa, Dha, Ni), each associated with specific vibrations believed to influence mental and physical balance. The term swara, derived from the root Swr meaning "to sound," appears in Vedic texts, especially the Sāmaveda, signifying tone or musical note. The Sāmaveda, meaning "knowledge of melodies," is regarded as the foundation of both Vedic and classical Indian music (Pal, 2017).

3. Sound as a Creative Force

- **Shabda Brahman**: In Vedic philosophy, sound (Shabda) is equated with the ultimate reality (Brahman), symbolizing the universe as a manifestation of vibrational energy.
- **Role in Creation**: The Vedas assert that sound vibrations played a pivotal role in creation. For instance, the Rigveda's hymns articulate the vibrational structure of the cosmos, while the Atharvaveda delves into sound's ability to shape physical and spiritual realities.

4. Healing and Therapeutic Applications of Sound

- **Mantras**: Vedic mantras are meticulously arranged syllables designed to generate specific vibrational frequencies. These vibrations influence the body, mind, and energy fields, fostering healing and spiritual evolution.
- **Chandas (Meter)**: The rhythmic structure of Vedic hymns aligns with natural rhythms, such as heartbeat and breath, promoting relaxation and concentration.
- **Sonic Geometry in Yagnas**: Vedic rituals (yagnas) incorporate precise mantra chanting to create vibrational fields that purify the environment and enhance well-being.

5. The Physics of Sound in Vedic Philosophy

- **Spanda (Vibrations)**: Spanda describes the dynamic, oscillating nature of sound, mirroring modern theories of wave-particle duality in physics.

- **Resonance and Sympathetic Vibrations**: The Vedic tradition highlights resonance, wherein sound vibrations influence corresponding frequencies in the human body and the environment, a concept supported by modern acoustics.

6. The Influence of Sound on Consciousness

- **Mind-Sound Connection**: Vedic wisdom recognizes sound's profound impact on the mind, with specific frequencies and mantras capable of altering brainwave patterns to induce calmness, focus, or transcendence.
- **Chakra Activation**: Vedic teachings associate particular sounds with the body's energy centers (chakras). Chanting syllables such as Lam, Vam, or Ram is believed to balance and energize these centers.

7. Symbolism of Sound in Vedic Cosmology

- **Nada and the Five Elements**: The Panchamahabhuta theory links each element—earth, water, fire, air, and ether—with unique vibrational qualities. Ether (Akasha), the medium for sound, holds a central role in this system.
- **Bija Mantras (Seed Sounds)**: Monosyllabic sounds like Om, Hrim, and Klim encapsulate specific energies, reflecting the Vedic understanding of sound as the seed of creation.

8. Modern Science Meets Vedic Sound Knowledge

- **Scientific Parallels**: The principles outlined in Vedic texts align with modern discoveries. For instance, Masaru Emoto's experiments on sound's impact on water molecules echo the Vedic idea of sound purification during rituals.
- **Research on Om Chanting**: Studies have demonstrated that chanting Om can calm the nervous system, reduce stress, and enhance mindfulness, offering scientific validation for these ancient practices.

Biomusicological Analysis of Vedic Chants

Vedic chants represent an extraordinary repository of sonic knowledge, embodying intricate acoustic and vibrational characteristics. These sacred hymns, carefully designed with

precise rhythms, melodies, and tonal structures, extend their impact far beyond spiritual devotion. They profoundly influence the physiological and psychological states of the human body. A biomusicological examination of these chants uncovers their acoustic qualities, their effects on key health markers such as heart rate variability (HRV), and their relevance in comparison to modern music therapy.

1. The Acoustic Dynamics of Vedic Hymns

- **Sonic Frequencies in Vedic Chants**:
  - Vedic chants are composed of structured syllables, intonations, and metrical patterns (chandas), producing specific frequencies that harmonize with the body's natural rhythms and the surrounding environment.
  - The chant of Om, often regarded as the primordial sound, resonates at frequencies aligning with the Earth's natural frequency (Schumann Resonance, approximately 7.83 Hz), believed to encourage relaxation and inner balance.
- **Mantras as Vibrational Modulators**:
  - The repetitive chanting of Vedic mantras generates a vibrational field that influences the body's subtle energy systems, such as chakras and nadis (energy channels).
  - The deliberate pronunciation of vowels and consonants enhances the vibrational energy, creating effects that range from calming to energizing.
- **The Principle of Resonance**:
  - Chanting activates resonance in the body's cavities, such as the chest, throat, and nasal passages, amplifying the impact of sound vibrations.
  - This resonance improves blood circulation, stimulates the vagus nerve, and positively influences the autonomic nervous system.

2. The Link Between Vedic Chants and Heart Rate Variability (HRV)

- **Understanding HRV**:
  - Heart rate variability (HRV) measures the variation in time between consecutive heartbeats, serving as an indicator of the balance between the sympathetic and parasympathetic nervous systems.
  - Higher HRV is associated with better stress management, adaptability, and overall health.
- **Impact of Vedic Chants on HRV**:
  - Research has shown that chanting specific Vedic hymns, including Om, can significantly enhance HRV, reflecting a calming effect on the body.
  - The rhythmic repetition of chants regulates breathing patterns, promoting synchronization between heart and respiratory rhythms. This synchronization activates the parasympathetic nervous system, reducing stress and encouraging relaxation.
- **Rhythmic Breathing and Chanting**:
  - Vedic chanting naturally incorporates rhythmic breathing, where the alternation of syllables corresponds to inhalation and exhalation.
  - Practices like Pranava Sadhana (chanting Om) are linked to lower heart rates, reduced blood pressure, and decreased anxiety, further showcasing their physiological benefits.

3. Vedic Chanting vs. Modern Music Therapy

- **Essence of Vedic Chanting**:
  - Rooted in ancient traditions, Vedic chanting combines sound, breath, and rhythm to create harmony within the mind and body.
  - Its focus on intentional sound vibrations, repetition, and breathing synchronization delivers both spiritual and physiological benefits.
- **Core Principles of Modern Music Therapy**:

- Modern music therapy uses scientifically designed music and sound interventions to address mental health issues, cognitive functions, and physical ailments. Das, *et al.*, (2022) examined the impact of chanting the 'Hare Krishna Mantra' on EEG rhythms. Post-chanting, a significant increase in alpha band power was observed, indicating a relaxed and peaceful mental state. The findings suggest that HKM chanting could be a simple and effective method to manage stress, depression, and tension.
- Techniques like guided imagery, active listening, and improvisation aim to evoke emotional responses and stimulate neural pathways.

- **Key Comparisons**:
  - **Purpose and Intention**: Vedic chanting targets holistic well-being, combining spiritual elevation with physiological balance, whereas modern music therapy often focuses on addressing specific health concerns.
  - **Scientific Support**: Modern music therapy is well-supported by empirical studies, while Vedic chanting is gaining scientific recognition, with studies linking it to improved HRV, reduced stress, and cognitive benefits.
  - **Practice and Accessibility**: Modern music therapy typically requires trained professionals and tools, while Vedic chanting can be practiced individually with proper guidance and minimal resources.
  - **Cultural Context**: Vedic chanting is deeply intertwined with Indian philosophy and culture, offering a unique perspective, while modern music therapy is more universally adaptable across cultures.

Applications in Modern Contexts: Reviving Vedic Sound Therapies

The profound understanding of sound's therapeutic properties found in Vedic traditions is experiencing a resurgence in today's health and wellness landscape. Concepts of vibrational healing, harmonic balance, and the transformative power of sound,

as detailed in ancient Vedic texts, are being seamlessly integrated into modern therapies and practices. These principles are applied across various domains, including stress management, holistic healing, mental health, and personalized therapeutic interventions. Below is an exploration of how Vedic sound principles are being adapted in contemporary settings, offering significant benefits to individuals in health, therapy, and daily life.

1. Incorporating Vedic Sound into Modern Music Therapy

- **Vedic Chants in Music Therapy**: Contemporary music therapy increasingly integrates Vedic chants, mantras, and rhythmic patterns. The structured repetition and vibrational qualities of mantras like the Gayatri Mantra or Mahamrityunjaya Mantra have been shown to offer therapeutic effects comparable to modern sound therapy tools.
    - **Targeted Sound Healing**: Vedic sound principles are applied to address specific issues, such as anxiety, depression, chronic pain, and insomnia. Research shows that the frequencies generated by Vedic chants can produce calming effects on the central nervous system, akin to the impact of instruments like Tibetan singing bowls or gongs.
    - **Brainwave Synchronization**: Rhythmic chanting of Vedic mantras promotes synchronization of brainwaves, inducing states of relaxation or meditation. Goldsby, *et al*., (2022) explore how singing-bowl sound healing impacts emotional and spiritual well-being, focusing on the connection between changes in spiritual well-being and reductions in tension and depression. The findings showed a strong link between improved spiritual well-being and decreased tension and depression after the healing session.Techniques involving mantra chanting can facilitate Alpha, Theta, or Delta brainwave states, fostering calmness, deep meditation, or restorative sleep.

2. Vedic Sound in Meditation and Mindfulness Practices

- **Enhancing Guided Meditations with Mantras**: Guided meditations often include Vedic chants like “Om” or the Gayatri Mantra to deepen relaxation, sharpen focus, and

cultivate inner clarity. These chants enhance the overall meditative experience.

- **Mindfulness Through Sound**: Mindful listening to Vedic mantras helps practitioners achieve present-moment awareness by concentrating on the sound, reducing stress and emotional turbulence.
- **Digital Accessibility**: Modern meditation apps increasingly feature Vedic chants and mantras, making these practices accessible to a global audience. Such apps are widely used to promote mental health and relaxation through guided audio sessions.

3. Holistic Healing Through Vedic Sound

- **Vibrational Healing Techniques**: Vedic concepts of sound frequencies align with modern vibrational medicine. Sound baths using chants and specific frequencies create an environment conducive to emotional, mental, and physical healing.
- **Balancing Energy Centers**: Mantras are used to harmonize energy centers (chakras). Specific sounds stimulate or calm particular chakras, promoting overall energetic balance and wellness.
- **Ayurveda and Sound Therapy**: Ayurveda incorporates sound as a key healing modality, using chants and vibrations to balance the doshas (Vata, Pitta, Kapha). This holistic approach is now being embraced by wellness centers worldwide.

4. Clinical Applications of Vedic Sound Therapy

- **Hospital and Rehabilitation Settings**: Vedic sound therapies are gaining traction in medical environments, where sound waves are used to enhance circulation, improve sleep, and alleviate pain.
- **Stress Relief in Critical Care**: Chanting-based therapies are introduced in critical care to reduce stress and anxiety in patients. For example, soothing chants may be used during pre- or post-surgical recovery to lower stress and

aid faster healing.

- **Pain Management**: Chronic pain therapies now include Vedic sound principles, as exposure to specific frequencies can elevate pain tolerance and reduce discomfort by modulating the nervous system's responses.

5. Vedic Sound in Yoga and Physical Wellness

- **Integrating Sound into Yoga Practice**: Yoga sessions often incorporate Vedic sound principles, such as chanting "Om" or other mantras, to strengthen the mind-body connection during poses (asanas) and breathing exercises (pranayama).
    - **Breath and Sound Synergy**: Combining controlled breathing with Vedic chanting supports better lung capacity, cardiovascular health, and mental clarity.
    - **Sound-Based Yoga Therapy**: Practices like Nada Yoga and Kundalini Yoga emphasize the role of sound and vibration in achieving physical and emotional harmony, making them increasingly popular in wellness retreats and yoga studios.

6. Digital Expansion of Vedic Sound Practices

- **Online Wellness Programs**: The digital era has enabled widespread access to Vedic sound practices through online courses and virtual wellness programs. These platforms teach mantra chanting, sound healing, and meditation, allowing people to incorporate these traditions into their daily lives.
    - **Meditation Apps and Audio Resources**: Mobile applications now feature guided Vedic chanting, sound baths, and relaxation techniques, making the benefits of ancient sound practices more accessible than ever.

Challenges in Reviving and Researching Vedic Sound Therapy

The revival and exploration of Vedic sound therapy present unique challenges, as this ancient practice exists at the intersection of cultural, spiritual, and scientific domains. Integrating its profound traditions into modern therapeutic and research frameworks is a complex endeavor. These challenges include

philosophical, methodological, and cultural barriers, as well as limitations in scientific measurement and technological innovation. Below are some of the key hurdles and potential solutions:

1. Lack of Standardized Practices

- **Diversity in Traditions**: Vedic sound practices encompass diverse techniques, such as chanting, mantras, and sound vibrations, rooted in ancient Indian traditions. Different schools, regions, and lineages interpret these practices uniquely, creating significant variation.
    - **Key Challenge**: The absence of standardized methodologies makes it difficult to establish uniform protocols for research or therapeutic use. The subjective nature of sound experiences further complicates consistency.
    - **Potential Solution**: Developing a standardized yet flexible framework for Vedic chanting and sound modulation, while respecting cultural and spiritual nuances, can help create reproducible methods for scientific and clinical applications.

2. Difficulty in Aligning Ancient Concepts with Modern Science

- **Philosophical Foundations**: Vedic sound therapy is deeply rooted in concepts like *Nada* (primordial sound), *Shabda Brahman* (divine sound), and *Prana* (life force), which are inherently metaphysical. These ideas often do not align with the empirical, quantifiable methods used in modern science.
    - **Key Challenge**: Translating spiritual and metaphysical principles into measurable, testable frameworks remains a major obstacle. While physical properties of sound (e.g., frequency, amplitude) can be studied, the holistic effects on consciousness and energy are difficult to quantify.
    - **Potential Solution**: Researchers can focus on bridging the gap by examining physiological or neurological outcomes, such as brainwave patterns, heart rate variability, or stress markers, while drawing connections to traditional beliefs.

3. Limited Research and Empirical Evidence

- **Underexplored Territory**: While sound therapy has gained popularity, rigorous studies on the specific effects of Vedic chants and mantras are sparse. Most existing research focuses on generalized sound therapies without delving into the nuances of Vedic traditions.
    - **Key Challenge**: The lack of controlled, peer-reviewed studies limits the ability to validate the therapeutic claims of Vedic sound therapy, reducing its acceptance in mainstream healthcare.
    - **Potential Solution**: Large-scale, multidisciplinary research initiatives could explore the physiological and psychological effects of Vedic sound practices, adhering to modern scientific standards while respecting traditional knowledge.

4. Cultural and Religious Sensitivities

- **Sacredness of Vedic Practices**: Vedic sound therapy holds deep spiritual and religious significance within Hindu traditions. Mantras are considered sacred, and their use often transcends physical or mental health benefits, extending to spiritual growth.
    - **Key Challenge**: Presenting Vedic sound therapy as a secular, evidence-based treatment may be viewed as inappropriate or disrespectful by traditional communities. At the same time, its association with religious practices could alienate individuals from different cultural or spiritual backgrounds.
    - **Potential Solution**: A culturally sensitive approach is essential, framing Vedic sound practices as tools for holistic well-being while acknowledging their spiritual roots. Collaboration with traditional practitioners can ensure authenticity and inclusivity.

5. Subjectivity and Individual Experiences

- **Variability in Perception**: The effects of Vedic sound therapy are highly subjective, influenced by an individual's state of

mind, beliefs, and emotional well-being. Personal experiences with mantras or sound meditation can vary widely.

- **Key Challenge**: Scientific methodologies favor objective data, making it difficult to evaluate subjective outcomes reliably. Placebo effects and personal belief systems may also influence perceived benefits.
- **Potential Solution**: Research designs could incorporate both quantitative and qualitative approaches, focusing on measurable outcomes like stress reduction or brain activity while acknowledging individual variability.

6. Technological Barriers

- **Challenges in Measuring Subtle Effects**: Many claims about Vedic sound therapy relate to its influence on subtle energies, such as *Prana* or the chakras, which are not easily measurable using current scientific tools.
  - **Key Challenge**: The inability to detect or quantify these subtle effects limits their validation and scientific acceptance.
  - **Potential Solution**: Advancements in biofeedback systems, neuroimaging, and energy-detecting technologies could help capture the subtle physiological and energetic shifts induced by sound therapy.

7. Risk of Commercialization and Misrepresentation

- **Commercial Exploitation**: As alternative therapies gain popularity, there is a risk of diluting the authenticity of Vedic sound therapy for profit. Misrepresentation or oversimplification of its principles can undermine its integrity and therapeutic value.
  - **Key Challenge**: Superficial or profit-driven adaptations may overshadow the depth and authenticity of traditional Vedic practices, leading to misinformation about their benefits.
  - **Potential Solution**: Promoting ethical practices, rigorous education, and collaboration between traditional

practitioners and researchers can help preserve the essence of Vedic sound therapy while adapting it responsibly for modern use.

Future Directions in Biomusicology and Vedic Practices

Biomusicology, an interdisciplinary field examining the connection between music, biology, and human health, is rapidly evolving. Recent advancements in understanding the therapeutic effects of sound have spurred interest in incorporating ancient traditions like Vedic sound therapy into modern healthcare systems. This fusion of traditional practices with contemporary science offers vast potential for addressing modern health challenges. Below are the key directions for future research and applications in biomusicology and Vedic sound therapy:

1. Integrating Vedic Sound Therapy with Modern Medicine

- **Holistic Healthcare Models**: The future of medicine is likely to embrace integrative approaches that combine conventional treatments with complementary therapies, including Vedic sound practices. As evidence supporting the healing properties of sound grows, Vedic chanting and mantras may find their place in clinical settings.
    - **Therapeutic Applications**: Vedic sound therapy could serve as a supplementary treatment for conditions such as anxiety, depression, and chronic pain. For instance, sound healing might complement traditional medical interventions by enhancing recovery, reducing stress, and supporting palliative care.
    - **Mental Health Benefits**: With increasing emphasis on mental health, researchers could explore the role of Vedic chants in managing conditions like PTSD, insomnia, and emotional imbalances. Specific sound frequencies and mantras may offer targeted benefits for emotional regulation and cognitive health.

2. Advancing Scientific Research on Vedic Sound Practices

- **Validating Therapeutic Effects**: While anecdotal evidence highlights the benefits of Vedic sound therapy, rigorous

scientific studies are essential to substantiate its claims. Emerging technologies like neuroimaging and biofeedback offer opportunities to document its physiological and psychological impacts.

- **Brainwave Studies**: Investigating how Vedic chants influence brainwave activity could uncover their effects on relaxation, meditation, and mental focus. There is a study introduces a novel method to analyze and compare the frequency ranges of Vedic chantings from the Rig, Yajur, Atharva, and Sama Vedas. The frequencies of these chantings were compared with brainwave frequencies. Notably, Sama Veda frequencies align with the alpha range, while the others fluctuate around it (Nalluri, *et al*.,2023). Tools such as EEG and fMRI could reveal changes in neural pathways associated with stress reduction and emotional balance.
- **Heart Rate Variability (HRV)**: As HRV reflects the balance of the autonomic nervous system, future studies might explore how rhythmic chanting improves HRV, promoting resilience and overall well-being.

3. Personalized and Precision Sound Therapy

- **Tailored Sound Healing**: Just as precision medicine customizes treatment to individual needs, sound therapy could evolve to address specific health profiles. Advances in technology might enable practitioners to design personalized soundscapes tailored to an individual's emotional state, health history, or physiological responses.
  - **AI-Driven Solutions**: Artificial intelligence could play a transformative role in sound therapy, creating dynamic programs that adjust sound frequencies and rhythms in real time to suit the user's needs. These personalized tools could support relaxation, cognitive enhancement, or stress management.
  - **Immersive Virtual Healing**: Virtual and augmented reality technologies could provide immersive Vedic sound experiences, allowing users to engage with tailored

soundscapes in a virtual environment for therapeutic purposes.

4. Cross-Cultural Collaboration and Integration

- **Blending Eastern and Western Traditions**: One of the most promising aspects of biomusicology is its ability to bridge cultural divides, integrating Eastern practices like Vedic chanting with Western music therapy and other indigenous sound traditions.
    - **Global Knowledge Sharing**: Collaborative networks of researchers, therapists, and spiritual practitioners could foster a deeper understanding of sound healing across cultures. This exchange of knowledge would enrich biomusicology and lead to innovative therapeutic approaches.Vedic chant doesn't impact only human but other living beings also. Singh, et al., (2023) found that music exposure, particularly Vedic chanting, may have a calming effect on freshwater fish Catla. Singh, et al., (2024) suggested that certain total protein, Albumin and Globulin components remained stable, the A/G ratio was responsive as significant as a result of vedic chant exposure to freshwater fish Catla.
    - **Comparative Research**: Future studies could compare Vedic sound therapy with other traditional practices, such as Tibetan singing bowls or indigenous sound rituals, to identify universal principles of sound healing.

5. Education and Training in Sound Therapy

- **Academic Programs in Sound Healing**: As biomusicology grows, there will be an increasing demand for formal education in sound therapy. Universities and institutions could introduce programs that combine scientific research with traditional knowledge, offering certifications in Vedic sound practices and their applications.
    - **Healthcare Integration**: Medical schools and training programs could incorporate sound therapy into their curricula, equipping future healthcare professionals with tools to use sound-based interventions alongside

conventional treatments.

6. Technological Innovations in Sound Therapy

- **Wearable Sound Devices**: The development of wearable devices that deliver therapeutic sound frequencies directly to users could revolutionize sound healing. Headsets, patches, or other wearable technologies could emit Vedic-inspired sounds for relaxation, focus, or healing.
    - **Brain-Computer Interfaces (BCI)**: BCI technology could enable users to influence sound therapy sessions through their cognitive or emotional states, providing a real-time, personalized healing experience.

7. Environmental and Societal Applications of Sound

- **Community Healing through Sound**: Large-scale sound healing events, featuring Vedic mantras or similar practices, could foster collective well-being in communities. One study investigated how age and preferred emotional music affect mood. It was hypothesized that older adults would choose happy music more often. Findings showed that older individuals focusing on emotions experienced less negative mood after happy music, while those less focused on emotions had reduced negativity after sad music (Shifriss, *et al*.,2020). These gatherings could address societal stress, trauma, or crises through the harmonizing effects of sound.
- **Urban Soundscapes**: Incorporating natural and Vedic-inspired sounds into urban environments could improve public spaces by reducing noise pollution and creating calming atmospheres. Research could explore how soundscapes influence community
- well-being and environmental harmony.

CONCLUSION

The exploration of biomusicology within the framework of Vedic traditions highlights a profound interplay between sound, vibration, and human health. This intersection offers remarkable insights into how ancient practices can complement modern scientific paradigms. Vedic sound practices—such as chanting, mantras, and rhythmic vibrations—possess therapeutic potential

that transcends their spiritual roots, profoundly influencing both mental and physical well-being.

From a biomusicological perspective, the vibrational frequencies inherent in Vedic sounds serve as a bridge between metaphysical concepts and physiological responses. These sounds demonstrate the transformative role of vibration in fostering balance and health. Research into the acoustic characteristics of Vedic hymns, their rhythmic structures, and their impact on brainwave patterns and heart rate variability underscores the potential of integrating these ancient practices into modern therapeutic frameworks.

The future of biomusicology in the context of Vedic traditions lies in adopting a multidisciplinary approach. This involves combining traditional knowledge with advanced scientific research to uncover how Vedic sound therapies influence the nervous system, emotional regulation, and overall health. As modern technology progresses, it paves the way for applying these therapies in personalized, accessible formats, allowing more people to experience their benefits.

Reviving and incorporating the ancient system of Vedic sound-based healing into contemporary practices presents a unique opportunity to harmonize tradition with innovation. By further investigating the profound effects of sound on human health, the integration of Vedic principles with modern biomusicology opens new doors for holistic healing. This fusion holds immense promise for enhancing physical health, emotional well-being, and spiritual growth in today's world.

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INDIA'S AGRICULTURAL CONTRIBUTIONS TO GLOBAL FOOD SECURITY AND SUSTAINABLE DEVELOPMENT

Net Ram[1*], Himanshu Ranjan[1], Lalit Kumar Verma[2], Paras Kamboj[1], Neeraj Kumar[1], Omendra Pal[1], Raghvendra Pratap Singh[1] and Kuldeep Kumar[3]

[1]Research Scholar, Department of Agronomy, [2]Research Scholar, [2]Department of Agricultural Economics & Statistics, [3]Research Scholar, Department of Genetics and Plant Breeding, R.S.M. (P.G.) College, Dhampur, Bijnor, U.P.[*]netramgangwar58@gmail.com

ABSTRACT

Agriculture plays a vital role in India's economy, not only contributing to food security at the national level but also playing a significant role in global agricultural sustainability. With over half of India's population engaged in agriculture, the sector is central to India's development, providing food, raw materials, and employment. India's agricultural contribution to global food security is immense, as the country produces a wide range of food items that sustain millions of people worldwide. This chapter explores India's role in global food security, sustainable agricultural practices, and its strategies to achieve the United Nations Sustainable Development Goals (SDGs), with a focus on environmental conservation, resource management, and poverty alleviation. Agricultural media and innovations, such as agricultural films, television programs, radio, and digital platforms, have revolutionized knowledge dissemination in India's rural areas, enabling farmers to adopt sustainable farming practices. This chapter delves into the evolution of agricultural media, examining the role of digital platforms, mobile applications, and television programs like DD Kisan, which enhance rural awareness. Additionally, we will discuss case studies showcasing the impact of agricultural media, government policies, and strategies aimed at reducing the sector's vulnerability to climate change, while promoting organic farming, precision agriculture, and water-efficient farming techniques. The chapter will also highlight the latest data, showcasing the effectiveness of such interventions and their contributions to global food security.

Keywords: India, Agriculture, Global Food Security, Sustainable Development, Agricultural Productivity, Agroecological Practices, Climate-Smart Agriculture, Soil Health, Precision Farming, Organic Farming, Export, Sustainable Development Goals (SDGs), Agricultural Policy, Rural Development, Food Security, Agricultural Research, Climate Change, Market Access, Food Trade, Integrated Farming Systems, Agricultural Technology, Agricultural Exports, Soil Conservation, Water Management, National Mission on Sustainable Agriculture, Government Schemes, Rural Infrastructure, Digital Literacy, Poverty Alleviation, Food Trade Policy, Crop Diversification, Biodiversity Conservation, Environmental Sustainability.

INTRODUCTION:

India's agricultural sector has a profound influence on global food security and sustainable development. As one of the world's largest producers of agricultural commodities, India plays a pivotal role in shaping both domestic and international food systems. With its vast land area, diverse climatic conditions, and a rich history of agricultural practices, India's contribution to global food security cannot be overstated. The country's agricultural output feeds a substantial portion of the global population and is a major component of the world's agricultural trade.

India's agricultural practices have evolved over the years, from traditional subsistence farming to modern, technology-driven approaches that focus on increasing productivity, improving sustainability, and ensuring food security for future generations. Despite these advancements, the country faces numerous challenges, including climate change, resource depletion, and the growing demand for food due to population growth.

In addressing these challenges, India has adopted several policy measures and technological innovations aimed at ensuring sustainable agricultural production while contributing to global food security. At the same time, the country has embraced the principles of sustainable development, focusing on environmental

protection, economic growth, and social equity in its agricultural practices.

This chapter aims to examine India's contributions to global food security and sustainable development. It will explore the role of Indian agriculture in feeding the world, the impact of government policies and programs, the challenges faced by the sector, and the solutions that can ensure continued progress in both food security and sustainability. Additionally, the chapter will analyze India's participation in global agricultural trade and its role in promoting sustainable farming practices on a global scale.

India's Role in Global Food Security

India's agricultural contribution to global food security is immense, as it produces and exports a wide range of foodstuffs critical to feeding millions across the world. Some key contributions include:

1. Staple Crops

India is one of the world's largest producers of essential food crops like rice, wheat, and pulses. These crops form the base of the diet for billions of people across Asia, Africa, and even the Middle East. India is the world's leading exporter of rice, supplying over 30% of global rice exports, especially to countries in Africa and Southeast Asia. The Green Revolution of the 1960s significantly improved food grain productivity, allowing India to meet its domestic demand and become a net exporter.

2. Diverse Crops

India also produces a range of fruits and vegetables, including mangoes, bananas, tomatoes, and potatoes. These crops are not only vital for the domestic market but are also exported globally. India is the largest exporter of spices, including chili, black pepper, and turmeric, which are integral to global cuisines, particularly in Asia, Europe, and the Americas.

3. Livestock and Dairy

India is home to the world's largest population of livestock, including cattle, buffaloes, goats, and sheep. This

population forms the foundation of the country's dairy industry, making India the largest producer of milk globally. India's contribution to global food security also includes its role in meat production and the export of dairy products to international markets.

4. Nutritional Security

India's contribution to global food security is not limited to quantity but extends to nutrition. Through the export of nutrient-rich pulses, oilseeds, and vegetables, India plays a significant role in improving the nutritional intake of many developing countries.

5. Current Data:

Below is a table illustrating India's agricultural contributions to global food security and sustainable development:

Indicator	India's Contribution	Global Impact
Total Agricultural Area	157.35 million hectares	India is the largest producer of crops like rice, wheat, and pulses.
Global Rice Production Rank	2nd largest	Contributes approximately 20% to global rice production.
Global Wheat Production Rank	2nd largest	Accounts for 13% of global wheat production.
Global Pulses Production Rank	1st largest	India produces about 25% of the world's pulses.
Export of Agricultural Products	$45 billion (2022)	India is a leading exporter of rice, spices, and pulses.
Organic Farming Area	2.7 million hectares	India ranks 9th globally in organic farming area.
Agricultural Research & Development (R&D)	Significant investments	India contributes to global agricultural innovation and technology development through institutions like ICAR.
Sustainable Agriculture Initiatives	25% of farmland under sustainable practices	Indian farmers increasingly adopt agroecological practices to conserve soil and water.
Farmer Welfare Programs	Various schemes like PMFBY, Soil Health Cards	Government schemes aimed at improving food security and farmer resilience.
Agricultural Employment	54% of the workforce	Agriculture remains the largest employer in rural India.

Source: Ministry of Agriculture & Farmers Welfare, 2023; FAO, 2023.

Sustainable Agricultural Practices in India

India faces numerous challenges related to climate change, soil degradation, and water scarcity, which threaten the sustainability of its agricultural systems. In response, the country has adopted various sustainable agricultural practices aimed at

enhancing productivity while preserving environmental resources.

1. Organic Farming

The promotion of organic farming has been one of India's strategies to reduce chemical dependency, restore soil health, and ensure food security without compromising environmental integrity. The government has introduced several schemes like *Paramparagat Krishi Vikas Yojana* (PKVY) to encourage organic farming and certify organic produce for both domestic and international markets. This shift toward organic farming is gaining momentum, with India emerging as one of the largest producers of organic products globally.

2. Agroforestry

Agroforestry, which integrates trees and shrubs into agricultural landscapes, has become a central strategy for increasing farm resilience to climate change. This practice helps improve soil health, reduce erosion, enhance water retention, and provide additional sources of income through the sale of timber, fruits, and other tree-based products. The Indian government's National Agroforestry Policy (2014) emphasizes the importance of this practice in promoting sustainable farming.

3. Water-Efficient Farming

India is home to some of the most water-stressed regions globally, making water management a priority in agricultural planning. Techniques like drip irrigation, rainwater harvesting, and watershed management are being promoted to increase water use efficiency. Programs like the *Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)* aim to improve irrigation systems, thus ensuring better water management and reducing dependency on monsoon rains.

4. Climate-Smart Agriculture

Climate change poses a severe threat to India's agricultural sector, affecting crop yields and productivity. Climate-smart agriculture (CSA) practices, such as the use of drought-resistant crop varieties, efficient pest management, and diversification of crops, are being encouraged to help farmers adapt to changing

climate conditions. India is also involved in international partnerships aimed at reducing agricultural greenhouse gas emissions and improving carbon sequestration.

Technological Innovations in Indian Agriculture

The role of technology in Indian agriculture is transforming the way farming is practiced. With the integration of digital tools, precision farming, and smart agricultural solutions, India's agriculture sector is becoming more efficient and sustainable. Key technological innovations include:

1. Digital Agriculture

Mobile phones and apps have revolutionized agricultural information dissemination in rural India. Apps such as *Kisan Suvidha*, *Pusa Krishi*, and *AgriApp* provide farmers with real-time information on weather conditions, crop management practices, market prices, and government schemes. This has allowed farmers to make informed decisions, improving yields and minimizing losses.

2. Precision Agriculture

The use of drones, sensors, and satellite imaging is making precision agriculture a reality in India. These technologies allow for real-time monitoring of crop health, soil conditions, and irrigation needs. By using data-driven insights, farmers can optimize resource use, minimize input costs, and increase productivity. The government's push towards digitization in agriculture through the *National Agricultural Market (e-NAM)* has also facilitated easier market access and price transparency for farmers.

3. Biotechnology

India has made significant strides in biotechnology, particularly in the development of genetically modified (GM) crops. Bt cotton, which has been widely adopted in India, has helped reduce pesticide use and increase yields. India continues to invest in research and development to create genetically modified crops that are resistant to pests, diseases, and extreme weather conditions, contributing to global food security.

1. Climate Change

Changing rainfall patterns, rising temperatures, and extreme weather events threaten the stability of India's agricultural systems. The vulnerability of the agricultural sector to climate change necessitates continuous adaptation strategies, including the promotion of drought-resistant crops, efficient water management, and better forecasting systems.

2. Rural Poverty and Inequality

While agriculture remains a key sector in rural India, poverty and inequality persist. Small and marginal farmers often struggle with low incomes, inadequate access to technology, and high levels of indebtedness. Comprehensive rural development programs that address these issues are crucial for ensuring food security and improving the livelihoods of farmers.

3. Technological Gaps

Despite advances in agricultural technology, the adoption of these technologies in rural India remains limited due to factors such as high costs, lack of infrastructure, and digital illiteracy. Addressing these barriers and improving technology access will be key to enhancing productivity and ensuring sustainable agricultural practices.

CONCLUSION

India's agricultural sector has significantly contributed to global food security and sustainable development. The country's diverse agricultural landscape supports the production of key crops, helping to stabilize global food markets. The role of agricultural media has been instrumental in promoting sustainable farming practices, improving farmer productivity, and facilitating the dissemination of information. Despite the challenges faced, India continues to make strides in improving digital access, increasing farmer awareness, and adopting innovative practices to address the growing demand for food and the impacts of climate change. Through continued investment in media, technology, and policy, India will remain a key player in the global agricultural landscape, ensuring the future of food security and sustainable development.

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INDIAN CHEMISTS AS ARCHITECTS OF SCIENTIFIC INNOVATION AND DISCOVERY

Sanobar[1], Ifra Khan[1], Amzad Khan[1], Shakeel Ahamad[1] , Asna Quraishi[2], Mohd Kamil Hussain[1*]

[1]Department of Chemistry, Govt.Raza P.G. College, Rampur - 244901, MJP Rohilkhand University Bareilly U.P, , [2]Department of Chemistry, Bareilly College Bareilly, MJP Rohilkhand University Bareilly U.P, India, Email: mkhcdri@gmail.com

ABSTRACT

Indian chemists have played a transformative role in advancing global scientific knowledge, from ancient innovations in metallurgy and medicine to groundbreaking modern research in materials science, pharmaceuticals, and molecular biology. This work highlights the significant achievements of key figures such as Acharya Prafulla Chandra Ray, Sir Shanti Swarup Bhatnagar, Dr. Khwaja Yusuf Hamied, Prof. C.N.R. Rao, Prof. Asima Chatterjee, Dr. Har Gobind Khorana, and Dr. A.V. Rama Rao. Their contributions span diverse fields including organic and inorganic chemistry, solid-state physics, genetic engineering, and drug discovery, integrating traditional Indian knowledge with contemporary scientific methodologies. The establishment of premier institutions like the Indian Institutes of Technology (IITs) and the Council of Scientific and Industrial Research (CSIR) has further cemented India's position as a global leader in chemical research and innovation. This review underscores the enduring impact of these scientists on global science, industry, and healthcare, and their legacy in inspiring future generations of researchers.

INTRODUCTION

Chemistry in India has a rich and diverse history, deeply rooted in ancient traditions and modern advancements. From the early practices of alchemy and metallurgy in the Indus Valley Civilization to the sophisticated development of Ayurveda, India has long explored chemical processes for medicinal, agricultural, and industrial purposes. The discovery of zinc extraction techniques in ancient Zawar mines and the production of wootz steel highlight

India's early contributions to materials science. In the modern era, India has become a global hub for chemical research and industrial production, with significant advancements in pharmaceuticals, agrochemicals, and petrochemicals. Prestigious institutions like the Indian Institute of Science (IISc) and Indian Institutes of Technology (IITs), along with the Council of Scientific and Industrial Research (CSIR) laboratories, play a pivotal role in driving innovation. CSIR labs such as the National Chemical Laboratory (NCL) in Pune, the Indian Institute of Chemical Technology (IICT) in Hyderabad, and the Central Drug Research Institute (CDRI) in Lucknow are at the forefront of cutting-edge research in chemical and pharmaceutical sciences. CSIR-CDRI, in particular, has made significant contributions to drug discovery and development, focusing on new therapeutic agents and addressing critical health challenges. These institutions collectively contribute to breakthroughs in drug discovery, materials chemistry, and green technologies, positioning India as a major player in the global chemical and pharmaceutical markets.

Sir Prafulla Chandra Ray

Acharya Prafulla Chandra Ray (August 2, 1861 – June 16, 1944) was an extraordinary scientist, educator, industrialist, philanthropist, and literary figure, widely recognized as *"the father of Indian chemistry."* He was a trailblazer in establishing modern chemical research in India and played a key role in blending traditional Indian knowledge with contemporary scientific practices. Born in **Raruli, Khulna District** (now part of Bangladesh), Ray excelled academically from a young age. He earned his **F.A. degree** from the **Metropolitan Institution** (now **Vidyasagar College**) while also attending his first chemistry classes as an external student at **Presidency College** under **Professor Alexander Pedler**. Captivated by the subject, he decided to pursue a career in chemistry with the ambition of making India a leader in scientific innovation. His academic pursuits took him to the **University of Edinburgh** on a prestigious **Gilchrist Prize Scholarship**, where he completed both his **B.Sc.** and **D.Sc.** degrees. Ray's research spanned multiple fields of chemistry, but he is best known for his pioneering work on **organic and inorganic nitrites**, which earned him the title *"Master of Nitrites."* His most notable

achievement was the discovery of **mercurous nitrite** in **1896**, a stable compound that paved the way for further research on the synthesis, structure, and decomposition of nitrites and hyponitrites across various metals. Throughout his career, Ray published over **150 original research papers**, contributing significantly to the advancement of chemical sciences. As a professor, Ray was deeply admired by his students for his forward-thinking approach and dedication to scientific development. He emphasized the fusion of **ancient Indian scientific traditions** with **modern research techniques**, striving to elevate India's global standing in science. Ray lived by the ancient Indian saying: *"Wish for victory everywhere except from your son and from your disciple,"* encouraging his students to surpass his own achievements. In addition to his scientific work, Ray made substantial contributions to literature. His landmark publication, *'A History of Hindu Chemistry'* (Vol. 1, 1902), documented India's ancient chemical heritage, while his autobiography, *'Life and Experiences of a Bengali Chemist'* (1932), offered a detailed account of his personal and professional journey. His enduring contributions were honored posthumously by the **Royal Society of Chemistry** with the **International Chemical Landmark Award** in **2012**. Even decades after his death, Prof. Ray's legacy continues to inspire the scientific community. His groundbreaking research has left a lasting impact on the fields of **organic** and **inorganic chemistry**, with numerous modern studies published in **ACS journals** and other scientific outlets building upon his foundational work, demonstrating his lasting influence in chemical sciences worldwide [1].

Dr. Shanti Swarup Bhatnagar

Sir Shanti Swarup Bhatnagar (1894–1955) was a pioneering Indian scientist, visionary leader, and institution builder, widely regarded as the *"father of research laboratories in India."* His contributions to the field of physical chemistry, particularly in **magneto-chemistry** and **colloid science**, were groundbreaking, but his lasting legacy lies in the establishment and development of India's scientific research infrastructure. Born on **21 February 1894** in **Bhera**, Punjab (now in Pakistan), Bhatnagar displayed an early aptitude for science and literature, particularly excelling in **Urdu poetry**. After completing his undergraduate studies in India,

he pursued advanced research in physical chemistry at **University College London** under **Professor F.G. Donnan**, where he earned his **D.Sc.** His early research focused on emulsions, surface tension, and colloidal chemistry, which laid the groundwork for his later scientific endeavors. Upon his return to India, Bhatnagar served as a professor at **Banaras Hindu University** and later at **Punjab University**, where he established a vibrant research environment. His work in applied chemistry was particularly noteworthy. He famously solved a critical problem for the **Attock Oil Company** by developing a method to prevent drilling mud from hardening when in contact with saline water. Rather than accepting personal financial rewards, he directed the funds to establish a department of petroleum research at Punjab University, reflecting his commitment to advancing scientific knowledge for national benefit. Bhatnagar's most significant contributions came as an **administrator and institution builder**. During **World War II**, he was appointed Director of the **Board of Scientific and Industrial Research (BSIR)**, which later evolved into the **Council of Scientific and Industrial Research (CSIR)** in **1942**. Under his leadership, CSIR became the cornerstone of India's scientific research infrastructure. He was instrumental in establishing a network of **national laboratories**, including the **National Physical Laboratory (NPL)**, **National Chemical Laboratory (NCL)**, and **Central Food Technological Research Institute (CFTRI)**. These institutions played a critical role in advancing scientific research and industrial development in post-independence India. Bhatnagar also served as the first **Secretary of the Ministry of Natural Resources and Scientific Research** and was a key member of the **Atomic Energy Commission of India**. His efforts in promoting **scientific and industrial research associations** laid the foundation for India's modern industrial landscape. He was a strong advocate for linking scientific research with national development and emphasized the importance of applying scientific knowledge to solve practical problems. For his contributions, Bhatnagar received numerous honors. He was knighted in **1941** for his services during the war and elected a **Fellow of the Royal Society (FRS)** in **1943**, one of the highest recognitions in the scientific community. Post-independence, he was awarded the **Padma Bhushan** in **1954**. His work also led to the establishment of the prestigious **Shanti Swarup Bhatnagar Prize for Science and Technology**, awarded

annually to outstanding Indian researchers in various fields of science. Bhatnagar's life was marked by a rare combination of scientific brilliance, administrative acumen, and a deep sense of patriotism. His sudden death on **1 January 1955** was a great loss to the scientific community. However, his legacy lives on in the thriving research institutions he established and the countless scientists he inspired. Sir Shanti Swarup Bhatnagar remains a symbol of India's scientific awakening and its journey toward self-reliance and innovation[2].

Dr. Khwaja Yusuf Hamied

Khwaja Yusuf Hamied (born July 25, 1936) is an Indian scientist, entrepreneur, and philanthropist, best known for his role as the chairman of **Cipla**, one of India's leading pharmaceutical companies. Born in **Vilnius** (then part of Poland, now Lithuania) to an Indian Muslim father, **Khwaja Abdul Hamied**, and a Lithuanian Jewish mother, **Luba Derczanska**, Hamied was raised in **Bombay (**now Mumbai). His multicultural upbringing influenced his global outlook and commitment to social justice. Educated at the **Cathedral and John Connon School** and **St. Xavier's College** in Mumbai, he later moved to the UK to study chemistry at **Christ's College, Cambridge**, where he earned both his **BA** and **PhD**. Hamied's most significant contribution lies in his fight to make essential medicines affordable for the developing world. Under his leadership, **Cipla** challenged Western pharmaceutical giants by producing low-cost **generic antiretroviral drugs** for **HIV/AIDS** treatment. In **2001,** Hamied announced that Cipla could offer a triple-drug AIDS therapy for just **$1 a day**, a revolutionary step that made life-saving medication accessible to millions, especially in Africa [3,4] His commitment to public health extended to developing **multi-drug combination pills** for diseases like **tuberculosis, asthma**, and **diabetes**, and creating **pediatric formulations** to benefit children in impoverished regions. Hamied's philanthropic efforts are equally notable. He has made substantial donations to **Cambridge University**, leading to the establishment of the **Yusuf Hamied Centre**, the **Hamied Scholars Programme**, and the renaming of the **1702 Chair of Chemistry**. His humanitarian approach earned him the **Padma Bhushan** in **2005** and numerous other accolades

[5]. Hamied's legacy as a scientist and social entrepreneur continues to inspire, embodying the principle that access to healthcare is a fundamental human right.

Professor C.N.R. Rao

Prof. C. N. R. Rao is one of the most influential scientists in the fields of solid-state chemistry and materials science, with a career spanning over seven decades. Prof. Rao has authored more than 1,800 research papers and 56 books, covering areas such as spectroscopy, solid-state chemistry, nanomaterials, and two-dimensional materials like graphene. His early work in infrared and UV-visible spectroscopy laid the foundation for his later research in solid-state chemistry during the 1960s to 1980s. He made pioneering contributions to understanding defects in oxides, pressure-induced phase transitions, metal-insulator transitions, and ferroelectricity. His studies on transition metal oxides, especially those with perovskite structures, significantly advanced the understanding of these materials. Notably, his early work on layered perovskites like La, CuO,, and La, NiO,, was critical in the lead-up to the discovery of high-temperature superconductivity in the 1980s. In recent years, Prof. Rao has made significant contributions to the study of metal-organic frameworks (MOFs) and low-dimensional materials such as graphene, MoS, , fullerenes, and carbon nanotubes. His research has opened new pathways in materials science, leading to technological advancements in electronics and energy storage. Beyond research, Prof. Rao has played a pivotal role in developing India's scientific infrastructure. He helped establish premier institutions like the Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR) and was instrumental in launching the NanoMission under the Ministry of Science and Technology. His efforts have elevated India's position in global science. Recognized with numerous awards, including the Bharat Ratna in 2014, Prof. Rao's legacy of scientific excellence and mentorship continues to inspire generations of scientists worldwide [6].

Professor Asima Chatterjee

Asima Chatterjee (1917–2006) was a pioneering Indian chemist whose groundbreaking work in natural products chemistry

earned her recognition as one of the foremost scientists of her time. Born in Calcutta, she pursued her education with distinction, earning a Master's degree from the University of Calcutta in 1940, followed by a DSc in 1944-making her the first woman to earn a doctorate in science from an Indian university. Chatterjee's research primarily focused on the chemistry of alkaloids, coumarins, and other plant-derived compounds. She made significant contributions to the structural elucidation and synthesis of biologically active natural products. Her work on Rauwolfia alkaloids, such as rauwolscine, played a vital role in understanding their medicinal properties, particularly in treating hypertension and mental disorders. She also investigated coumarins and terpenoids, isolating numerous compounds with potential therapeutic applications. Throughout her career, Chatterjee's innovative methods in structural analysis, including the use of spectroscopic techniques and chemical transformations, led to the discovery of new synthetic pathways and reaction mechanisms. Her research had practical implications, resulting in the development of drugs like Ayush 56 for epilepsy and Ayush 64 for malaria. Beyond her scientific achievements, Asima Chatterjee was a dedicated educator and mentor, guiding 59 PhD and 3 DSc students and publishing over 300 research papers. She also played a significant role in science policy as a nominated member of the Rajya Sabha and contributed to educational reforms in India. Chatterjee's numerous awards, including the Shanti Swarup Bhatnagar Award, and her election as a Fellow of the Indian National Science Academy, underscore her enduring legacy in Indian science. Her work continues to inspire future generations of chemists and researchers in natural products and medicinal chemistry.A pioneering organic chemist, Chatterjee's work on alkaloids and plant-based medicines contributed significantly to pharmacology. Her research on the anti-epileptic drug Ayush-56 and cancer therapeutics is notable[7].

Dr. Har Gobind Khorana

Har Gobind Khorana (1922–2011) was an eminent biochemist and molecular biologist whose **pivotal** contributions to the field of genetics revolutionized our understanding of how genetic information is translated into proteins. Born in Raipur, a small village in Punjab, India, Khorana's early education was

humble, beginning under a tree in his rural village. Despite these modest beginnings, his academic brilliance shone through. He completed his Master's in Chemistry from Punjab University, Lahore, and later earned a Ph.D. in organic chemistry from the University of Liverpool, England. Following his doctoral studies, Khorana conducted postdoctoral research in Zurich with Nobel laureate Vladimir Prelog. Though his time there was brief due to financial constraints, it introduced him to carbodiimide chemistry, which later proved crucial in his synthesis of nucleotide cofactors. Unable to secure a position in India, Khorana moved to Canada, where he began independent research at the British Columbia Research Council. His early work focused on nucleotides and nucleic acids, leading to the first synthesis of coenzyme A and ATP. Khorana's career reached new heights when he joined the University of Wisconsin-Madison. Here, his research played a key role in deciphering the genetic code, alongside Marshall Nirenberg and Robert Holley. Khorana demonstrated that specific sequences of nucleotides, known as codons, correspond to particular amino acids. His work, which utilized synthetic oligonucleotides, provided critical confirmation of Nirenberg's earlier findings. This breakthrough earned Khorana the Nobel Prize in Physiology or Medicine in 1968, shared with Nirenberg and Holley.Beyond decoding the genetic code, Khorana achieved another scientific milestone by synthesizing the first artificial gene in vitro. This accomplishment laid the foundation for genetic engineering and synthetic biology, enabling scientists to manipulate genes for research and therapeutic purposes. In 1971, Khorana moved to the Massachusetts Institute of Technology (MIT), where he focused on the structure and function of membrane proteins, particularly bacteriorhodopsin and mammalian rhodopsin. His research in this area advanced the understanding of bioenergetics and visual processes.Throughout his career, Khorana was known for his humility and dedication to mentoring young scientists. He trained numerous students and postdoctoral researchers, many of whom went on to become leaders in academia and industry. His legacy extends beyond his scientific achievements, symbolizing the power of education and perseverance to overcome socio-economic barriers[8]. His work continues to influence biotechnology, genetics, and synthetic biology, leaving an indelible mark on the

scientific community.

Dr. A.V. Rama Rao

Alla Venkata Rama Rao (born April 2, 1935) is a distinguished Indian chemist and inventor renowned for his contributions to organic synthesis and drug technology. Born in Guntur, Andhra Pradesh, Rao pursued a Bachelor's degree in Chemistry from A.C. College, Andhra University, in 1956. After a brief stint as a demonstrator at his alma mater, he earned a postgraduate degree in Pharmaceuticals and Fine Chemicals from the University Department of Chemical Technology (UDCT), Mumbai University, in 1960. He later completed his Ph.D. in organic chemistry under the guidance of Krishnaswami Venkataraman at the National Chemical Laboratory (NCL) in 1965. Rao's research career took off at NCL, where he focused on synthetic dyes and elucidated the structure of lac dye, comprising four constituents of laccaic acid. His work extended to other insect pigments, leading to significant revisions in the understanding of their biogenetic origins. He isolated over 100 new compounds from plants and insects during this period. In 1975, he collaborated with Nobel laureate Elias James Corey at Harvard University, which shifted his focus to the synthesis of biologically active natural products, including antitumor antibiotics, macrolides, and immunosuppressants. Upon returning to India, Rao continued his research at NCL before becoming the director of the Indian Institute of Chemical Technology (IICT) in 1985. Under his leadership, IICT became a leading institution in chemical research, integrating private sector collaborations. He later founded **Avra Laboratories**, a company specializing in contract research and manufacturing of active pharmaceutical ingredients (APIs). Rao's contributions to organic synthesis are noteworthy, especially in asymmetric synthesis. He developed cost-effective methods for synthesizing anti-tumor antibiotics like Anthracyclines and Fredericamycin-A and pioneered chiral synthesis technology in India. His methodologies were instrumental in the affordable production of **Azidothymidine (AZT),** the first drug for AIDS treatment, and various other life-saving drugs like Vinblastine, Vincristine, and Etoposide. Rao has mentored over 100 doctoral students and holds more than 30 patents. His contributions have been recognized with

prestigious awards, including the **Padma Shri** in 1991 and the **Padma Bhushan** in 2016, underscoring his lasting impact on chemical research and drug technology in India.

CONCLUSION

The contributions of Indian chemists have been instrumental in shaping both national and global scientific landscapes. From ancient innovations in metallurgy and medicinal chemistry to modern advancements in pharmaceuticals, materials science, and molecular biology, Indian scientists have consistently pushed the boundaries of chemical research. Pioneers like Acharya Prafulla Chandra Ray and Sir Shanti Swarup Bhatnagar laid the foundation for India's scientific infrastructure, while modern leaders such as Dr. Khwaja Yusuf Hamied and Prof. C.N.R. Rao have propelled India onto the global stage with transformative innovations and institutional developments. These chemists not only made significant scientific discoveries but also emphasized the application of science for societal benefit, exemplified by affordable healthcare solutions and sustainable technologies. Their legacies continue to inspire future generations, ensuring that India remains a key player in global scientific advancement and innovation.

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MICROPLASTICS IN AQUATIC SYSTEMS: A GROWING THREAT TO MARINE LIFE

Nagma Khan[1], Baby Tabassum*, Asma Hasan[1] and Mohammad Hashim[2]

[1]Department of Zoology, Toxicology Lab, Govt. Raza P.G. College, Rampur (U.P.) 244901, [2]Department of Biochemistry, Mohammad Ali Jauhar University, Rampur (U.P.) 244901

E-mail: dr.btabassum@gmail.com, knagma244901@gmail.com

In recent decades, there has been a tremendous increase in awareness of the environmental damage caused by plastic waste. While plastic waste can vary in size from small particles to large pieces measuring several meters, the current societal awareness is mostly with synthetic microplastics that have a dimension below 5 mm. A variety of plastic items, including packaging, containers, coatings, bags, and others, are widely employed in everyday life. MPs have a high level of chemical stability, allowing them to remain long-lasting in the environment for thousands of years or more. Polymeric polymers, including polyethylene terephthalate (PET), polystyrene (PS), polyvinyl chloride (PVC), and polyethylene (PE), account for over 90% of worldwide plastic manufacturing. Furthermore, these microplastics (MPs) serve as carriers for a variety of harmful substances in pharmaceutical and personal care items, as well as natural pollutants such as polychlorinated biphenyls (PCBs), dichloro diphenyl trichloroethane (DDT), polycyclic aromatic hydrocarbons (PAHs), and others. The growing influence of MPs has led to the emergence of global MP pollution as a serious concern. These polymers' physicochemical properties govern how these micro-sized particles interact in a variety of environments. The connection between MPs and biota (organisms) is impacted by plastic size. MPs' debris causes them to bind more quickly to the exterior and interior areas of waterborne or land-based creatures. Because of their polarity and functional groupings, MPs have a tendency to indulge in other contaminants from the surroundings. MPs in the food chain may pose an environmental risk owing to their bioavailability. However, microplastics are not inert materials. They may absorb and leach numerous chemicals from the environment, serving as transporters for toxic substances such as heavy metals, insecticides, and non-

biodegradable biological contaminants. When consumed, these poisons can penetrate an organism's tissues, compromising its health. The related toxicity can be passed up the food chain, causing bioaccumulation, especially when heavy metals are present. Microplastics may enter the ecosystem through numerous paths. Despite this, ingestion is the principal pathway through which microplastics impact aquatic life.

The influence of microplastics (MPs) on aquatic species has been extensively studied, shown by a notable rise in publications detailing findings from many taxonomic groups, including laboratory and field studies, as well as their function as carriers for organic pollutants. MPs may be within the ideal prey. spectrum for several aquatic organisms, including zooplankton, mollusks, crustaceans, fish, seabirds, and marine mammals, rendering them bioavailable for consumption. Direct ingestion pathways encompass particle absorption via filter, suspension, and deposit feeders, which gather and categorize particulate matter to capture and consume suitable sizes. The effectiveness of uptake is contingent upon the interplay of particle size, shape, and density, which influence the positioning of microplastics within the water column and sediments. Research has demonstrated the impact of microplastics on zooplankton, whereas marine copepods, a widely prevalent group, have been examined for their influence on feeding efficiency and reproductive performance. Prolonged exposure to 20 μm PS microplastics diminished the feeding capacity. and reduced the reproductive output of the pelagic copepod Calanus helgolandicus, whereas extended exposure to PET microplastics adversely impacted the reproductive output of the calanoid copepod Parvocalanus crassirostris, resulting in population decline.

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RELEVANCE OF BUDDHA'S TEACHINGS IN ESTABLISHING WORLD PEACE IN THE ERA OF CONFLICT

Shivam Saxena and Anil Kumar
[1]Research Scholar, Department Of Ancient History And Culture, Government Degree College Budaun (U.P), [2] Assistant Professor & Head of History Department Govt Degree College, Budaun (U.P).

"Buddhism is not just a religion of the past or a mere faith as many have thought, but it is a time-tested scientific religion and philosophy which, in the context of the present world situation, is more relevant today than ever before for establishing world peace."
— **Kenneth W. Morgan, The Path of the Buddha**

ABSTRACT:

We live in a global village where events in one region can significantly impact others, though the nature and intensity of these impacts vary. In the 20th century, the race for control of geo-political resources, particularly raw materials, led to World War I, causing immense trauma and displacement. The League of Nations was established to prevent another world war, but Germany's humiliation and Hitler's ambition led to World War II, resulting in unimaginable human and material losses. After World War II, the United Nations and other international organizations were created to prevent conflicts, though they were not entirely successful in the Cold War era. Despite these efforts, minor and major conflicts continue to occur. Dag Hammarskjöld famously said, "The United Nations was not created to bring us to heaven, but to save us from hell."

Can we conclude that conflicts are inevitable and cannot be eliminated in the 21st century?

Indian Ancient Buddhist Philosophy, timeless and relevant to today's world, offers magical results if adopted. Despite originating in the 6th century BCE, it addresses contemporary issues like intolerance, regional aspirations, Neo-colonialism, and societal disintegration. Integrating Buddhist principles into global governance, economics, and environmental policies can foster

sustainable peace, harmony, and justice. In an era of conflicts, resource depletion, and ethical dilemmas, Buddhism provides a practical path to lasting global peace.

Keywords: Buddhism and Global Peace, Buddha's Teachings on Conflict Resolution, Ahimsa (Non-Violence) in Buddhism, The Four Noble Truths and Peace, The Eightfold Path for Harmony, Mindfulness and Conflict Resolution, Buddhist Ethics in Governance, Interdependence and Global Cooperation, Buddhist Diplomacy and Mediation, Buddhism and Social Justice, Economic Stability through Buddhist Principles, Sustainable Living and Buddhist Philosophy, Buddhist Perspective on War and Violence, Meditation for Peacebuilding, Role of Buddhist Monks in Peacekeeping

INTRODUCTION:

The relevance of Buddha's teachings in solving conflicts and establishing peace has become increasingly evident in today's world, where division, violence, and misunderstanding often dominate global discourse. Buddha's core teachings—such as the Four Noble Truths and the Eightfold Path—provide a profound philosophical framework that encourages self-awareness, compassion, and ethical conduct, all of which are essential in resolving conflicts and fostering peace. The principle of *Right Understanding*, which encourages individuals to see the world as it truly is, free from delusions and attachments, can help break the cycle of conflict fueled by ignorance and misunderstanding.

In real-life applications, many peace-building initiatives around the world have drawn on these principles. For example, conflict resolution efforts in regions like Sri Lanka, which has a Buddhist majority, often integrate mindfulness and the Buddhist approach of non-violence (*Ahimsa*) to mediate between opposing factions. Similarly, peace initiatives in Myanmar, despite the current turmoil, have emphasized dialogue and reconciliation through Buddhist teachings. Buddhist monks and community leaders have played crucial roles in advocating for peace and stability, demonstrating the practical impact of Buddha's wisdom.

The need for Buddha's teachings is particularly urgent in the face of modern challenges such as rising political tensions, sectarian violence, and global conflicts. These issues are often driven by misunderstandings, fear, and entrenched views that make dialogue and peaceful resolution difficult. Buddha's emphasis on compassion and interdependence provides a counter-narrative to the divisive ideologies that fuel such conflicts. Moreover, mindfulness practices, which are now widely incorporated into peace-building efforts, promote emotional regulation and conflict de-escalation, both of which are necessary for fostering meaningful peace in today's turbulent world.

In a world where traditional conflict resolution methods are often limited in effectiveness, Buddha's teachings offer a universal, holistic approach that focuses not only on external solutions but also on transforming inner attitudes and perceptions. This integrated approach is crucial in addressing both the symptoms and root causes of conflict, making Buddha's wisdom not only relevant but also necessary for establishing sustainable peace in the modern era.

Contemporary Relevance of Buddha's Teachings for Global Peace

Buddha emphasized that attachment to material possessions leads to suffering, advocating for inner contentment over excessive consumption. This principle of mindful consumption encourages individuals to focus on necessities rather than indulging in material excess. In today's world, this aligns with the growing movement towards sustainability. For instance, India's Mission LiFE (Lifestyle for Environment) promotes responsible consumption by encouraging eco-friendly habits such as reducing waste, conserving energy, and choosing sustainable products. Real-life examples include practices like minimalism, where individuals opt for a simpler lifestyle with fewer possessions, and corporate initiatives that focus on sustainable production, such as companies reducing plastic use and promoting ethical sourcing. By embracing mindful consumption, individuals contribute to both personal well-being and environmental sustainability.

Promoting scientific temper and rational inquiry is crucial

for fostering global peace and progress. Encouraging critical thinking and inquiry is essential in helping individuals make informed decisions and engage in rational discourse, which is necessary for resolving global conflicts and promoting peace initiatives. Real-life examples include the development of peace-building programs that emphasize dialogue and evidence-based approaches, such as the peace initiatives led by organizations like the United Nations, which rely on scientific research and rational decision-making to mediate international conflicts. Additionally, rejecting dogmatism is key in this process, as it emphasizes the importance of personal experience and reason over blind faith. This approach fosters open-mindedness and encourages progressive thought, as seen in the growing movements advocating for science-based policy decisions, such as those supporting climate change action. By prioritizing mindfulness and right understanding, individuals and societies can move beyond rigid belief systems and adopt more flexible, thoughtful perspectives.

Ethical and citizen-centric governance is crucial for building trust and ensuring the well-being of society. Buddha's teachings, particularly the principles of *Right Speech*, *Right Conduct*, and *Right Livelihood*, offer a solid foundation for promoting honest leadership, inclusive policies, and service-oriented administration. These principles encourage leaders to speak truthfully, act ethically, and engage in work that benefits others, fostering an environment where public servants prioritize the needs of citizens. Real-life examples of this approach can be seen in countries like Bhutan, where the government incorporates Buddhist principles of happiness and well-being into its national policies, ensuring that governance is focused on the welfare of the people. Furthermore, anti-corruption measures are essential in ensuring ethical governance, and Buddha's emphasis on ethical self-discipline can play a significant role in curbing bribery and the misuse of power. In places like Singapore, where strict anti-corruption laws and a culture of integrity are promoted, public servants are held to high standards of ethical conduct, helping to create a transparent and accountable government. By embedding ethical behavior into governance structures, societies can reduce corruption, promote justice, and ensure that leadership remains focused on serving the greater good.

Buddhism's principles offer valuable guidance for addressing environmental conservation and climate action, focusing on the interconnectedness of all life and promoting sustainable practices. Buddhist monastic rules prohibit the cutting down of trees, highlighting the deep respect for nature and the belief that all living beings are interconnected. This view is reflected in the actions of various Buddhist communities around the world, such as the efforts in Thailand where Buddhist monks have led campaigns to protect forests and advocate for the preservation of biodiversity. Buddhism also encourages community-based sustainability, emphasizing equitable resource sharing and the protection of indigenous rights. For example, in Nepal, Buddhist principles are incorporated into community-led conservation initiatives, where local communities manage natural resources in a way that respects both environmental and cultural heritage. Additionally, the concept of the *Middle Path*, which advocates moderation, is a key framework for sustainable development. It calls for balance between economic growth and environmental preservation, urging societies to avoid excessive consumption while promoting responsible development. This approach can be seen in Bhutan's Gross National Happiness index, which prioritizes environmental sustainability and the well-being of citizens over purely economic measures. By embracing these Buddhist principles, societies can foster environmental conservation, promote climate action, and create a more sustainable future for all.consumption, reducing climate change and over-exploitation of resources.

Buddhism places great emphasis on peace, harmony, and coexistence, offering practical solutions to conflicts through principles like ahimsa (non-violence), the law of karma, and interfaith harmony. Ahimsa, or the principle of non-violence, is a fundamental Buddhist teaching that promotes resolving conflicts without aggression. This philosophy has influenced many global peace movements, including Mahatma Gandhi's non-violent resistance against British colonial rule and Martin Luther King Jr.'s civil rights movement in the United States. In the modern world, this principle remains relevant in addressing terrorism, wars, and extremism. For example, Buddhist leaders like Thich Nhat Hanh advocated for non-violent solutions during the Vietnam War,

urging world leaders to engage in dialogue rather than destruction. The law of karma reinforces moral responsibility by teaching that our actions have consequences, shaping our present and future realities. This principle encourages individuals and nations to act with kindness, fairness, and justice, fostering a more peaceful society. Countries like Bhutan, which integrates Buddhist values into governance through its Gross National Happiness (GNH) index, prioritize well-being, sustainability, and harmony over material wealth, demonstrating how Buddhist teachings can create a more peaceful and ethical society. Buddhism also promotes interfaith harmony, recognizing the importance of tolerance and mutual respect among different religious traditions. Unlike many religions that focus on the concept of God, Buddha neither affirmed nor denied God's existence; instead, he emphasized ethical living, compassion, and self-awareness. This approach encourages dialogue and peaceful coexistence among various faiths. In places like Sri Lanka and Myanmar, where religious tensions have risen, Buddhist leaders and organizations work to bridge divides and promote reconciliation. The Dalai Lama, a strong advocate for interfaith dialogue, has engaged with leaders from Hindu, Christian, Muslim, and Jewish traditions to foster global peace and mutual understanding. By advocating for non-violence, ethical responsibility, and religious tolerance, Buddhism provides a powerful framework for promoting peace and coexistence in an increasingly divided world. Its teachings continue to inspire individuals, communities, and nations to resolve conflicts through wisdom, compassion, and dialogue rather than violence and hatred.

Buddhism offers a profound approach to peaceful conflict resolution, emphasizing dialogue, mediation, and non-violent resistance over war and aggression. Throughout his life, Buddha actively promoted peace, often intervening in disputes to prevent violence. One well-documented example is his intervention in a conflict between the Shakya and Koliya clans, who were on the brink of war over water rights to the Rohini River. Instead of allowing bloodshed, Buddha persuaded both sides to engage in dialogue, highlighting the futility of war and the greater value of cooperation. This historical example illustrates how mediation and diplomacy can be powerful tools in resolving conflicts without resorting to violence. In the modern world, Buddhist principles of

non-violence and reconciliation continue to influence global peace efforts. Diplomats, conflict resolution specialists, and world leaders have drawn inspiration from these teachings to resolve political and social tensions.

Why Buddhism is Essential in the 21st Century

- Mental Well-Being: In a fast-paced, stressful world, Buddhist mindfulness practices can help combat anxiety, depression, and burnout.
- Digital Age Ethics: As technology advances, Buddhist principles can help guide ethical AI development, digital responsibility, and data privacy.
- Economic Stability: The Middle Path can address wealth inequality by promoting sustainable economies that benefit all, not just the elite.
- Global Unity: Buddhism's emphasis on interconnectedness fosters international cooperation and global harmony.
- Resilience in Crisis: Buddhist teachings can offer guidance in navigating modern crises, including pandemics, environmental disasters, and geopolitical conflicts.

Buddhism Philosophy

1. Buddhism as a Religion of Peace

- Buddhism is a scientific religion and philosophy promoting world peace.
- Humanism is central, crossing racial and national barriers.
- Attadipa (self-reliance): Buddha emphasized individual responsibility for spiritual progress.

2. Core Buddhist Principles for Peace

- Ahimsa (Non-violence): Avoidance of harm in thought, word, and action.
- Karuna (Compassion) & Maitri (Loving-kindness) as pillars of interpersonal harmony.

- Panchashila (Five Precepts): Basis for peaceful coexistence and ethical conduct.

3. Historical Influence of Buddhism on Peace

- Ashoka's Rule: After the Kalinga War, Ashoka embraced Buddhism, promoting non-violence and welfare policies.
- Modern Leaders Inspired by Buddhism: Gandhi, Nehru based political philosophies on Buddhist teachings.
- Indian Foreign Policy & Panchashila: Buddhism's role in shaping India's diplomatic principles.

4. The Noble Eightfold Path

- Wisdom: Right View, Right Intention.
- Ethical Conduct: Right Speech, Right Action, Right Livelihood.
- Mental Development: Right Effort, Right Mindfulness, Right Concentration.
- Purpose: Achieving peace at personal and societal levels.

5. Buddhism's Social & Political Contributions

- Equality & Social Justice: Opposition to caste discrimination.
- Moral Governance: Ethical leadership and fair resource distribution.
- Community & Integration: Role of Sangha in promoting peace.

6. Sacred Buddhist Texts on Peace

- Saddharmapundarikasutra (Lotus Sutra):
  - Advocates universal responsibility for peace.
  - Teaches compassion, service, and ethical living.
  - Depicts Devadatta's evil acts vs. Buddha's endurance.

- Kalachakra Tantra (Wheel of Time):
  - Tantric Buddhist practice for inner and world peace.
  - Taught by the Dalai Lama to eliminate war and suffering.
  - Bodhicitta: Developing enlightenment to benefit all beings.

7. The Role of Mind in Peace

- Mental State & Peace: Peace begins with a positive state of mind.
- Ignorance (Avidya) as the Enemy: Root cause of suffering.
- Dependent Origination (Pratityasamutpada): All things are interconnected.

8. The Buddha's Teachings as a Path to Global Harmony

- Substitution of Hatred with Compassion.
- Service and Sacrifice for the betterment of society.
- Bodhisattva Ideal: Individuals work selflessly for universal peace.

9. Practical Applications of Buddhist Teachings

- Personal Peace: Meditation, mindfulness, ethical living.
- Social Peace: Justice, non-violence, and universal brotherhood.
- Global Peace: Diplomatic policies rooted in compassion.

10. Relevance in the 21st Century

- War & Conflict Resolution: Buddhist teachings provide a framework for non-violent solutions.
- Sustainable Living: Promotes harmony with nature and equitable resource distribution.

- Cultural & Religious Harmony: Encourages tolerance and mutual respect.

Implementing Buddha's Philosophy in Solving Contemporary Conflicts:

1. Israel-Palestine Conflict

Location: Middle East

Start Date: 1948

Loss & Damage:

- Casualties:
  - Over 100,000 killed in various wars and clashes.
  - Thousands of civilians, including women and children, have died in Israeli airstrikes and Palestinian rocket attacks.
- Displacement:
  - Over 5 million Palestinian refugees scattered in Gaza, West Bank, Jordan, Lebanon, and Syria.
  - Israeli civilians in border towns face constant displacement due to rocket attacks.
- Infrastructure Damage:
  - Gaza Strip: Frequent bombings have destroyed hospitals, schools, roads, and power plants.
  - Israeli Towns: Damage from rocket attacks, though Israel's Iron Dome defense system mitigates some threats.
- Economic Collapse:
  - Blockade on Gaza causes extreme economic distress, with over 50% unemployment.
  - Israel faces military spending burdens and losses from disrupted trade.

Mental Trauma:

- PTSD & Anxiety: Both Israeli and Palestinian children suffer from post-traumatic stress disorder due to years of war.
- Generational Trauma: Decades of violence fuel hatred, fear, and mistrust between both sides.
- Psychological Impact on Families: Loss of loved ones, uncertainty, and poor living conditions increase depression and suicide rates.

Buddhist Solution:

- Ahimsa (Non-Violence): Both sides must abandon violent means and pursue dialogue. Non-violent protests, reconciliation, and diplomacy should replace armed struggle.
- Maitri (Loving-Kindness): Encourage understanding between Jewish and Palestinian communities through education and interfaith harmony.
- Dependent Origination (Interdependence): Recognizing that peace in one region affects global stability, international communities should mediate rather than take biased sides.

1. Generosity (Dana) – Selflessness in governance.
2. Morality (Sila) – Ethical ruling without corruption.
3. Sacrifice (Pariccaga) – Putting people's needs first.
4. Honesty (Ajjava) – Truthfulness in policies.
5. Gentleness (Maddava) – Avoiding aggression in diplomacy.
6. Self-Control (Tapa) – Resisting greed and violence.
7. Non-Violence (Ahimsa) – Prioritizing peace over war.
8. Patience (Khanti) – Avoiding rash decisions.

9. Non-Hatred (Avihimsa) – Resolving conflicts peacefully.
10. Justice (Dhamma) – Ensuring fairness and equality.

2. Economic & Social Reforms Based on Buddhist Principles

- Right Livelihood: Encourage businesses to prioritize ethical labor, fair wages, and environmental protection.
- Simple Living & Sustainability: Reduce greed-driven capitalism that fuels exploitation and inequality.
- Mindfulness-Based Education: Teach emotional intelligence and moral reasoning to prevent future conflicts.

3. Preventing Future Conflicts

- Buddhist Conflict Resolution Training: Establish international peace centers where leaders, diplomats, and citizens can study Buddhist conflict resolution methods.
- Compassion-Based Rehabilitation: Reforming violent individuals through Buddhist meditation and psychological healing.
- Global Meditation Movements: Large-scale global meditation events to reduce aggression and violence worldwide.

CONCLUSION:

Buddhism teaches that true peace starts with the mind. If we apply mindfulness, compassion, wisdom, and ethical governance, we can not only resolve today's wars but also prevent future conflicts.

A Buddha-inspired world is one where:

- Leaders prioritize ethical governance.
- Communities foster tolerance and compassion.
- Nations work together for peace, not power.

By embracing Buddhist values, we transform societies from war-torn divisions into peaceful, just, and interconnected global communities.

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IMPLEMENTATION OF YOGA IN ACADEMIC INSTITUTIONS AND PROFESSIONAL WORKSPACES

Neelima Singh[1] and Harsh Vardhan Mishra
[1]Associate Professor, Department of Physical Education, Govt. P.G College, Bilaspur, Rampur, U.P., [2]Associate Professor, Department of Sanskrit, Govt. P.G College, Bilaspur, Rampur, U.P

INTRODUCTION

In the modern professional landscape, stress has become an unavoidable aspect of daily work life, significantly impacting employees' overall well-being and professional efficiency. This issue extends beyond individual health concerns, directly influencing workplace productivity and organizational performance. Consequently, corporations are increasingly exploring strategies to assist their workforce in mitigating stress, with yoga and meditation emerging as two prominent mindfulness-based interventions. The relentless demands of contemporary work environments—marked by stringent deadlines, escalating expectations, and the pervasive influence of technology—exacerbate stress levels. When left unaddressed, this persistent strain can culminate in burnout, absenteeism, and a notable decline in overall productivity. To counteract these detrimental effects, organizations are prioritizing holistic approaches that tackle the root causes of occupational stress. Rooted in ancient Eastern traditions, yoga and meditation were historically perceived through spiritual and philosophical lenses. However, scientific research has substantiated their tangible physiological and psychological benefits, reinforcing their relevance in modern professional settings. Through a comprehensive review of existing literature, empirical analyses, and real-world applications, this discussion seeks to explore how integrating these mindfulness practices can foster a transformative impact on employees and workplace culture. As businesses increasingly acknowledge the interdependence between employee well-being and corporate success, understanding the implications of yoga and meditation in professional settings becomes imperative.

The Interconnection Between Workplace Stress, Productivity, and Employee Well-being: Extensive research has established a strong correlation between occupational stress, employee productivity, and overall well-being. Elevated stress levels have been consistently linked to heightened absenteeism, diminished job satisfaction, and compromised work performance. Furthermore, prolonged exposure to chronic stress significantly increases the risk of various physical and psychological health complications, including cardiovascular diseases and anxiety disorders. Organizations that cultivate a supportive work culture, encourage social cohesion, and implement structured stress management initiatives have demonstrated notable success in mitigating these adverse effects. By fostering a positive work environment, businesses can not only enhance employee engagement but also drive overall organizational efficiency.

Physiological and Psychological Benefits of Yoga and Meditation: From a physiological standpoint, yoga and meditation have been shown to lower cortisol levels—a primary stress hormone—while promoting cardiovascular health and strengthening immune function. Psychologically, these practices contribute to enhanced mindfulness, stress alleviation, and improved emotional regulation. Additionally, meditation has been found to optimize cognitive function, sharpen attention, and bolster mental clarity. Beyond workplace advantages, these holistic disciplines offer a multitude of health benefits, including:

- **Enhanced Physical Flexibility and Mobility**: Yoga involves a structured combination of postures and stretches designed to improve flexibility and agility. Regular practice gradually enhances joint mobility, alleviates muscular stiffness, and fortifies overall physical endurance. These improvements contribute to better posture, a reduced risk of injuries, and a more active lifestyle.
- **Stress Alleviation Beyond the Workplace:** Beyond professional responsibilities, individuals who engage in meditation and yoga experience reduced stress levels in their personal lives. These practices provide effective tools for navigating daily challenges, fostering mindfulness, and cultivating a balanced and centred approach to life.

- **Improved Mental and Emotional Well-being:** The psychological advantages of yoga and meditation extend to enhanced emotional resilience and reduced symptoms of anxiety and depression. Mindfulness practices reinforce emotional regulation, instilling a positive mindset and equipping individuals with the capacity to cope with life's stressors.

- **Enhanced Sleep Quality:** Regular engagement in yoga and meditation has been associated with improved sleep patterns, facilitating deeper and more restorative rest. This, in turn, contributes to overall physical rejuvenation, mental clarity, and heightened daytime productivity.

Incorporating Yoga into The Workplace: A Pathway To Enhanced Employee Well-Being: In the contemporary corporate landscape, prioritizing employee well-being has become a fundamental objective for organizations striving to cultivate a supportive work environment that fosters productivity and minimizes stress. One increasingly recognized approach to achieving this goal is the integration of yoga within workplace settings. As a holistic discipline that harmonizes physical postures, controlled breathing techniques, and meditative practices, yoga offers an extensive array of benefits that significantly enhance both mental and physical health. Implementing structured yoga programs within corporate environments can serve as a transformative strategy, not only fostering overall wellness but also strengthening employee engagement, resilience, and performance. By embedding yoga into workplace culture, organizations can create a healthier, more balanced, and highly productive workforce.

Advantages Of Corporate Yoga

1. **Alleviation of Workplace Stress: Yoga** is widely acknowledged for its ability to mitigate stress, making it particularly beneficial in high-pressure corporate settings. By incorporating structured yoga sessions, organizations enable employees to effectively manage stress through mindfulness techniques and deep breathing exercises. These practices foster relaxation and serve as a powerful countermeasure against the detrimental effects of workplace stress.

2. **Enhanced Cognitive Function and Productivity: Consistent** engagement in yoga has been shown to sharpen focus, improve concentration, and elevate productivity levels. By integrating yoga into the daily work routine, employees can experience heightened mental clarity, ultimately leading to enhanced job performance and greater professional satisfaction.

3. **Improved Physical Well-being:** In addition to its psychological benefits, yoga significantly contributes to overall physical health. Regular practice enhances flexibility, strengthens muscles, and improves balance—key factors in maintaining physical well-being. Encouraging employees to participate in yoga can help prevent common workplace-related injuries and promote long-term health.

4. **Fostering Work-Life Balance:** Implementing yoga as a component of workplace wellness initiatives reinforces the importance of work-life balance. By providing employees with opportunities to engage in mindfulness-based activities, organizations demonstrate a commitment to holistic well-being, ensuring a more harmonious and fulfilling professional environment.

Integrating Yoga into The Workspace

1. **Facilitate Regular Yoga Sessions:** To ensure accessibility and consistency, organizations can implement scheduled yoga sessions led by certified instructors. A well-structured timetable allows employees to seamlessly incorporate yoga into their routine, fostering long-term engagement and maximizing its benefits.

2. **Encourage Inclusive Participation:** Promoting yoga as an inclusive and non-competitive practice is essential for engaging employees across all fitness levels. Organizations can boost participation by emphasizing its accessibility, addressing potential apprehensions, and offering incentives to encourage involvement.

3. **Equip the Workplace with Essential Resources:** Establishing a conducive environment for yoga practice

involves providing essential equipment such as yoga mats, blocks, and a dedicated practice space. Ensuring a comfortable and safe setting enhances the overall experience, making participation more appealing.

4. **Educate Employees on Yoga's Benefits:** Raising awareness about yoga's physical and mental health advantages can dispel misconceptions and encourage greater participation. Hosting informational workshops or wellness seminars can introduce employees to fundamental yoga principles and cultivate interest in regular practice.

5. **Gather and Implement Feedback:** Continuous improvement is key to sustaining an effective corporate yoga program. Actively seeking employee feedback helps organizations tailor sessions to align with participants' preferences, ensuring the program remains relevant, engaging, and beneficial.

CONCLUSION

In summary, integrating yoga into the workplace is a strategic investment in both employee well-being and organizational success. By incorporating structured yoga sessions, companies can foster a work culture that prioritizes stress reduction, enhances focus, and promotes physical health. A well-designed corporate yoga program tailored to the needs of employees can contribute to a more balanced, engaged, and productive workforce. Ultimately, implementing yoga as part of a workplace wellness initiative creates a supportive and thriving professional environment—one where employees not only improve their overall health but also achieve greater personal and professional fulfilment.

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THE ROLE OF AGRICULTURAL FILMS AND MEDIA IN SHAPING RURAL AWARENESS AND DEVELOPMENT

Net Ram[1], Dr. Aakash[1*], Neeraj Kumar[1], Omendra Pal[1], Himanshu Ranjan[1], Raghvendra Pratap Singh[1], Paras Kamboj[1] and Ajab Singh[2]

[1*]Research Scholar, Department of Agronomy, [1+]Assistant Professor Department of Genetics and Plant Breeding, R.S.M. (P.G.) College, Dhampur, Bijnor, U.P., *E-mail- netramgangwar58@gmail.com

ABSTRACT

Agricultural films and media play a crucial role in disseminating knowledge, influencing farming practices, and fostering rural development. In a country like India, where agriculture is the backbone of the economy, media has emerged as a powerful tool for educating farmers about modern technologies, government schemes, climate resilience, and sustainable farming practices. This chapter explores the impact of agricultural films, television programs, radio broadcasts, digital platforms, and social media on rural communities. It also highlights case studies, recent data, and policy interventions that enhance media's effectiveness in agriculture. The discussion includes recommendations for improving media outreach for maximum farmer engagement and socio-economic development.

Keywords: Agricultural films, media, rural awareness, farming practices, sustainable agriculture, television programs, radio broadcasts, digital platforms, social media, mobile applications, agricultural communication, climate resilience, precision farming, integrated pest management, organic farming, soil health management, DD Kisan, Gaon Connection, YouTube channels, Kisan Suvidha app, WhatsApp groups, real-time farmer interaction, digital literacy, connectivity issues, misinformation, language barriers, regional language content, public-private partnerships, broadband expansion, fact-checking mechanisms, agricultural extension, rural development.

INTRODUCTION

Agriculture remains a fundamental pillar of India's economy, with nearly 54% of the workforce engaged in farming and allied activities (Ministry of Agriculture & Farmers Welfare, 2023). The dissemination of agricultural knowledge has traditionally been through extension services, but the advent of media has revolutionized the way farmers access information. Agricultural films, television programs, radio shows, social media platforms, and mobile applications are now shaping rural awareness and decision-making processes.

This chapter delves into various aspects of media's role in agriculture, analyzing its effectiveness, challenges, and the way forward for enhancing rural communication strategies.

Evolution of Agricultural Media in India

The role of media in agricultural awareness can be categorized into different phases:

1. **Traditional Media (Pre-1980s):**
    - Government-run radio programs like *Krishi Darshan* played a vital role in educating farmers about best practices, crop management, and weather conditions.
2. **Television and Print Media Era (1980s-2000s):**
    - The launch of *Doordarshan's Krishi Darshan* in 1967 and later private-sector interventions increased agricultural visibility.
    - Print media, including agriculture-specific magazines and newspapers, played a crucial role in disseminating knowledge.
3. **Digital Revolution (2000s-Present):**
    - Social media, mobile apps, and digital platforms have significantly enhanced real-time farmer interaction and knowledge-sharing.

- Emergence of e-learning platforms, AI-driven advisory services, and data-driven decision-making tools for farmers.

Impact of Agricultural Films and Media on Rural Awareness

1. Agricultural Films

Agricultural films, both documentary and instructional, have been instrumental in demonstrating best practices to farmers. Institutions like ICAR and IARI have produced films showcasing:

- Improved irrigation techniques
- Integrated pest management
- Soil health management
- Organic farming techniques
- Climate-smart agriculture

2. Television Programs

Programs like *DD Kisan, Gaon Connection*, and *E-TV Annadata* provide region-specific, crop-specific, and climate-specific guidance, offering:

- Live interactions with agricultural scientists
- Expert advice on disease and pest control
- Market price trends and financial planning for farmers

3. Radio Programs

Despite digital advancements, radio remains a critical medium, especially in remote rural areas. AIR's *Kisan Vani* continues to be an essential source of agricultural knowledge, featuring:

- Interviews with agricultural experts
- Information on government schemes
- Community discussions and farmer success stories

4. Digital and Social Media Platforms

The proliferation of digital media has led to the rise of:

- **YouTube channels:** *Kisan Helpline, Agri Doctor*, and *Farming Leader* provide video-based guidance.
- **Mobile Applications:** Apps like *Kisan Suvidha, Pusa Krishi*, and *IFFCO Kisan* provide weather updates, mandi prices, and expert consultations.
- **WhatsApp & Facebook Groups:** Farmers share real-time experiences and troubleshooting advice within peer networks.

Current Data and Trends

Media Platform	Percentage of Farmers Using (%)	Key Features
Television	58%	Weather updates, market prices, expert interviews
Radio	42%	Government schemes, agricultural advisories
Mobile Apps	36%	Pest control, fertilizer recommendations
Social Media	45%	Peer-to-peer learning, knowledge sharing
Agricultural Films	22%	Visual demonstrations of techniques

Source: Ministry of Agriculture & Farmers Welfare Report, 2023.

Case Studies

1. Impact of DD Kisan in Enhancing Awareness

A study by ICAR (2022) found that **70% of farmers who regularly watched DD Kisan improved their farming practices and increased productivity by 15%**. The program's interactive format and expert guidance contributed significantly to knowledge dissemination.

2. Role of Digital Media in Climate Resilience

A 2023 survey by the National Institute of Agricultural Extension Management (MANAGE) showed that **60% of farmers**

using mobile apps adapted better to erratic weather conditions compared to those relying on traditional methods.

Challenges in Agricultural Media

Despite its effectiveness, agricultural media faces several challenges:

- **Low Digital Literacy:** Many rural farmers struggle with accessing digital platforms due to a lack of education and technological familiarity.
- **Language Barriers:** Most digital content is available in Hindi and English, limiting regional reach.
- **Connectivity Issues:** Rural areas often suffer from poor internet access, restricting digital adoption.
- **Misinformation:** Unverified agricultural advice on social media can mislead farmers, causing financial and crop losses.

Future Prospects and Recommendations

1. **Localization of Content:** Expanding regional language programming will ensure better engagement among farmers from different linguistic backgrounds.
2. **Affordable Digital Access:** Expanding rural broadband infrastructure and making digital tools more affordable can bridge the connectivity gap.
3. **Public-Private Collaboration:** Partnerships between government, NGOs, and agri-tech companies can enhance media outreach and develop more farmer-centric initiatives.
4. **Fact-Checking Mechanisms:** Establishing agricultural fact-checking bodies to counter misinformation on social media and digital platforms.
5. **Community-Based Digital Literacy Programs:** Training farmers in digital literacy through government-run workshops and NGO initiatives.

CONCLUSION

Agricultural films and media have emerged as powerful tools in shaping rural awareness and promoting sustainable farming practices. While traditional media continues to be relevant, digital transformation offers unprecedented opportunities for real-time knowledge dissemination. Addressing challenges such as digital literacy and misinformation can further amplify the positive impact of media in agriculture, making it an indispensable tool for rural development.

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TOGETHER WE RISE: WEAVING NATIONAL PRIDE WITH PROGRESS

Amandeep Singh, Seema Teotia and Raju
Dept of Physics, Govt. Raza PG College, Rampur, U.P., India
Email: seemateotia73@gmail.com

ABSTRACT

Sustainable development and nationalism are intertwined factors that influence a country's development. Efforts toward economic prosperity, social solidarity and self-reliance are frequently motivated by a strong sense of national identity. Conversely, sustainable development makes sure that social justice and environmental integrity are maintained while economic progress is made. In order to promote long-term stability, important industries including agriculture, technology and government are essential. Economic resilience and rural empowerment have been facilitated by historical initiatives, policy reforms and technology advancements. Achieving sustainable growth requires inclusive government and public participation because they promote shared accountability in tackling economic and environmental issues. Countries can attain balanced growth that encourages self-sufficiency while retaining global significance by fusing sustainability with national advancement.

Keywords: Nationalism, Sustainable Development, Agriculture, Technological Innovation, Economic Growth, Environmental Sustainability, India

INTRODUCTION

Meri Mati Mera Desh highlights the sacrifices made for India's advancement and is a symbol of patriotism, national pride and cultural heritage. It encourages cooperation, civic duty and contributions in the fields of science, business, the environment and culture. These principles are upheld by programs like Azadi Ka Amrit Mahotsav, which promote proactive nation-building.

Nationalism and Progress: India's independence, industrialization and technological breakthroughs have all been fuelled by nationalism. While organizations like ISRO and DRDO

improve international reputation, programs like Make in India and Atmanirbhar Bharat increase economic self-reliance. Food security is ensured by sustainability initiatives like the National Mission for Sustainable Agriculture, while social cohesion is strengthened by initiatives like the Swachh Bharat Abhiyan. Cultural values and economic prosperity are aligned by policies like Digital India and Skill India. However, overzealous nationalism might impede international collaboration, thus a balanced strategy is required for long-term advancement.

This study looks at how nationalism and advancement in India's socioeconomic, technological and cultural domains interact. The historical development of nationalism, its function in policymaking, scientific developments (ISRO, DRDO), economic endeavours (Make in India, Atmanirbhar Bharat) and cultural impacts are all examined. It offers a comprehensive perspective on nationalism as a force behind sustainable development by evaluating environmental sustainability initiatives and the difficulties in striking a balance between nationalism and inclusivity and international collaboration.

Historical Context of Nationalism in India

Aspirations for political sovereignty, cultural identity and economic self-determination propelled India's nationalist movement in reaction to British colonial authority. In the struggle for independence, various areas, languages and religions were brought together by the strong bond between land and tradition, which created a common sense of national identity. Through their contributions to political movements, social reforms and cultural revivalism, freedom fighters, reformers and intellectuals significantly influenced Indian nationalism.

Indian nationalism was heavily reliant on land, which was both an economic and cultural symbol. Despite India's diversity, British initiatives like telephony and railroads unintentionally brought disparate areas together and strengthened a sense of shared national identity. By highlighting India's history, spirituality and unity, cultural revivalists like Swami Vivekananda, Bankim Chandra Chattopadhyay and Rabindranath Tagore strengthened the emotional connection between people and their homeland. Bharat

Mata and other symbols came to symbolize national pride. Because British land policies resulted in economic exploitation, starvation and poverty, which fueled demands for independence, the nationalist movement also aimed to regain sovereignty over resources.

Self-reliance emerged as a central tenet of Indian nationalism, promoting both political and economic freedom. Through the boycott of imported commodities and the resuscitation of domestic businesses, the Swadeshi Movement (1905) fought against British authority. Leaders like Bipin Chandra Pal and Lala Lajpat Rai placed a strong emphasis on enhancing India's economic power. Through large-scale campaigns like the Quit India Movement, Salt March and Non-Cooperation Movement, Mahatma Gandhi broadened this vision by endorsing self-sufficiency and khadi as emblems of defiance against colonial domination. His approach linked economic empowerment with moral and political independence.

The intellectuals, reformers and revolutionaries who opposed colonial rule and established the ideological foundation for independence influenced the nationalism movement. While Subhas Chandra Bose's Indian National Army (INA) engaged in military resistance to British rule, Bhagat Singh's sacrifice served as an inspiration to young people. In order to develop national unity and integrate princely kingdoms, Sardar Vallabhbhai Patel was instrumental. By addressing caste disparities, advancing education and advocating for women's rights, social reformers like Raja Ram Mohan Roy, Jyotirao Phule and Dr. B.R. Ambedkar made sure nationalism remained an inclusive movement. In order to create a contemporary nationalist vision and incorporate cultural and spiritual aspects into the fight for liberation, philosophers such as Swami Vivekananda, Tagore and Aurobindo Ghosh reinterpreted Indian customs.

Socio-Cultural Dimensions

Literature, art, music, film and community projects were all part of the sociocultural aspects of Indian nationalism, which promoted a sense of oneness and national awareness. Nationalism became a political, artistic and social movement for resistance and

advancement as a result of these creative manifestations. With works like Gitanjali, authors like Bankim Chandra Chattopadhyay and Rabindranath Tagore encouraged harmony and spiritual rebirth and literature was vital. By depicting India's historical grandeur, the Bengal School of Art, under the direction of Abanindranath Tagore and Nandalal Bose, questioned colonial narratives. Film, from Dadasaheb Phalke's Raja Harishchandra to filmmakers like Satyajit Ray, moulded national identity by portraying the freedom fight and post-independence issues, while music, like as Rabindra Sangeet and patriotic songs like Vande Mataram, spurred popular movements.

The preservation of cultural heritage, which represents India's reclaiming of its identity from colonial authority, became a fundamental component of nationalism. Cultural autonomy was strengthened through monument restoration, traditional art preservation and the promotion of indigenous craftsmanship. While leaders like Nehru and Patel stressed the value of heritage for national pride, the Archaeological Survey of India (ASI) carried out major restoration projects. Gandhi's appeal for the resurrection of traditional crafts and khadi during the Swadeshi movement connected cultural resurgence with economic independence, strengthening national cohesion and thwarting colonial control.

Economic Development and Nationalism

In India, nationalism and economic development are closely related, with entrepreneurship, rural development, indigenous industry and agricultural self-sufficiency all having a significant impact on the country's advancement. Beyond political movements, nationalism has manifested itself in economic policies that seek to empower local communities, achieve self-reliance and promote national development. These initiatives are in line with the larger goal of an India that is rich and economically independent.

With the Green Revolution of the 1960s, spearheaded by M.S. Swaminathan, making India a food-secure country through high-yielding varieties (HYVs), chemical fertilizers and sophisticated irrigation, agriculture continues to play a major role in the country's economy. Although food self-sufficiency has been attained, sustainability issues still exist and are being addressed

by programs such as the National Mission on Sustainable Agriculture (NMSA), which encourages resource efficiency and organic farming. The Atmanirbhar Bharat campaign (2020) further focuses rural economic empowerment through financial aid, infrastructural development and supply chain improvement. Rural India is intended to be improved by investments in roads, electricity and digital connectivity, while farmer earnings and housing are supported by programs like PM-KISAN and PMAY. Skill development projects are also preparing the workforce for rising areas like renewable energy, IT and manufacturing.

Startups are now a major force behind India's economic expansion, helping to diversify the economy, create jobs and advance technology. India is a worldwide startup hub because to government programs like Startup India, which offer tax breaks, venture capital assistance and ease of doing business. With unicorns like Flipkart, OYO and Zomato putting India on the international scene, industries like fintech, edtech, healthtech and agritech are driving this expansion.

MSMEs are the foundation of the economy, making about 30% of GDP, creating a large number of jobs, promoting domestic goods and lowering economic inequality. Micro-entrepreneurs can receive financial assistance from government programs like the Pradhan Mantri Mudra Yojana (PMMY), which promotes economic resilience and self-sufficiency.

Political and Policy Perspectives

Nationalism and development are strongly aligned in India's political and policy frameworks, which combine progressive policies with nation-building efforts to promote social, cultural and economic advancement. This strategy is strengthened by federalism, decentralization and public involvement, which guarantee that governance stays inclusive and sensitive to national goals. Together, these factors influence India's destiny by promoting solidarity, independence and long-term development.

This collaboration is best demonstrated by government initiatives that combine nationalism and development. Launched in 2021 to commemorate 75 years of independence, Azadi Ka Amrit

Mahotsav highlights economic empowerment and self-reliance while celebrating India's path from colonial domination to international acclaim. Initiated in 2015, Digital India seeks to bridge the digital divide and foster inclusive growth by enhancing connectivity, infrastructure and digital literacy in order to establish a society empowered by technology. In a same vein, the 2014 introduction of the Swachh Bharat Abhiyan encourages hygiene, sanitation and cleanliness, boosting waste management and public health while cultivating civic duty and patriotism.

India's democracy relies heavily on public engagement in governance, which strengthens nationalism by involving citizens in decision-making. Participatory programs like e-Government and M-Governance improve accountability and transparency while enabling direct public participation in policymaking. By enabling citizens to request information from public authorities, the Right to Information (RTI) Act of 2005 promotes democratic values and responsible governance. In order to make sure that decisions represent the needs of the public, government policies also depend more and more on citizen input through town halls, advisory committees and public hearings. This engagement fosters collective responsibility, strengthens democratic principles and reinforces the vision of a united and progressive India.

Scientific Temperament and National Development

A scientific temperament is crucial for influencing a country's future since it promotes technological development, economic expansion and an innovative and logical society. It ensures that national growth in India is informed by reason, research and scientific inquiry by playing a significant role in fields like space exploration, defence and digital transformation. A culture that values critical analysis, problem-solving and creativity is fostered by rational thinking and evidence-based decision-making, which aid in the formulation of policies based on facts rather than superstition or ideology. Furthermore, India combines cutting-edge scientific discoveries with its extensive traditional knowledge of astronomy, agriculture and Ayurveda to create a well-rounded strategy that preserves cultural legacy while fostering sustainability and socioeconomic progress. India's development is strengthened by

this combination of science and tradition, guaranteeing advancement that is both profoundly ingrained and technologically sophisticated.

Challenges and Future Directions

In India, eradicating myths and superstitions is essential to the advancement of science. False beliefs can be refuted by utilizing mass and social media, encouraging scientific literacy and incorporating logical thinking into the classroom. To remain globally competitive, bolstering research in cutting-edge areas like artificial intelligence, quantum computing and biotechnology calls for strong infrastructure, more funding and cooperation between government, business and academia. With programs like National Science Day and Vigyan Yatra raising awareness, dispelling myths and promoting creativity through multidisciplinary research and assistance for aspiring scientists, public participation in scientific discourse is crucial.

Environmental Sustainability and Land Conservation

The long-term development and progress of any country depends on environmental sustainability. In India, policymakers and stakeholders are faced with the crucial task of striking a balance between rapid industrialization and ecological preservation. As the country's economy continues to expand, it is crucial to make sure that this growth is in line with environmental conservation in order to ensure the welfare of future generations. This section examines the importance of conserving soil and water, government policies on sustainable development and the efforts to strike a balance between industrialization and ecological preservation.

The Significance of Soil and Water Conservation in National Progress

1. **Soil Conservation** – India encourages sustainable methods including agroforestry, terracing and water harvesting to combat soil erosion, desertification and land degradation. These increase agricultural resilience, improve fertility and stop soil erosion. For sustained productivity, the National Mission for Sustainable Agriculture (NMSA) emphasizes soil conservation.

2. **Water Conservation** – India prioritizes supply-side and demand-side solutions in light of water constraint brought on by pollution, over-extraction and unpredictable rainfall. While programs like Jal Jeevan Mission and Jal Shakti Abhiyan support community-driven water access and rainwater harvesting, the National Water Mission (NWM) under NAPCC encourages water-use efficiency across sectors.

3. **Impact on Agriculture & Food Security** – Conserving soil and water improves agricultural output, lessens the need for pesticides and boosts economic resilience—all of which support long-term food security and environmental sustainability.

Balancing Industrialization with Ecological Preservation

India's fast industrialization has resulted in pollution, urbanization and higher energy consumption, making growth and environmental preservation policies necessary. Cleaner technology adoption is encouraged by policies like the Perform, Achieve and Trade (PAT) program and the National Clean Energy Fund (NCEF), which encourage energy efficiency and reduce emissions. With programs like the Swachh Bharat Mission and Made in India encouraging eco-friendly manufacturing, India is moving toward a circular economy that emphasizes recycling and waste reduction. The National Biodiversity Action Plan (NBAP) and Environmental Impact Assessment (EIA) protect ecologically fragile areas including wetlands and forests. The development of green technologies and renewable energy presents encouraging answers for a sustainable future, notwithstanding obstacles like resource depletion and industrial pollution.

Military and Strategic Strength

A country's military prowess and strategic alliances are directly related to its security and international clout. For India, preserving a strong military industry and cultivating solid foreign ties are essential to preserving its independence and expanding its influence globally. The importance of a robust military industry for national security, India's advancements in domestic defense manufacturing and its strategic alliances in international security are all covered in this section.

Role of a Strong Defense Sector in National Security

1. **National Security Importance** – India needs a strong military to maintain peace and defend its sovereignty in the face of complicated security issues including terrorism and territorial disputes.

2. **Role of Armed Forces** – By being ready, advancing technology and being strategically prepared, the Army, Navy and Air Force deter enemies and maintain national security.

3. **Defence Modernization** – India concentrates on improving military technologies, such as fighter jets, ballistic missile defence and domestic submarines, in order to increase capabilities.

4. **Internal Security & Counterterrorism** – By conducting operations in Kashmir, the Northeastern states and responding to events such as the 2008 Mumbai attacks, the defence industry plays a significant role in mitigating internal security risks. In these endeavours, enhanced intelligence and monitoring are essential.

Strategic Partnerships and India's Role in Global Security

Through strategic alliances with other countries, India improves its defense, economy and geopolitical standing while tackling issues like marine security and terrorism. COMCASA, BECA and LEMOA are important defense accords with the United States that improve intelligence sharing, joint exercises and military cooperation. Providing military equipment and working together on defense research, Russia is still a long- standing defense partner. Israel offers drone technology, surveillance and counterterrorism, while France supplies fighter jets, submarines and naval hardware. India is a strong supporter of nuclear non-proliferation, peaceful conflict resolution and a rules-based international order. It actively participates in the UN, BRICS, SCO and Quad to advance Indo-Pacific stability. By guaranteeing unrestricted travel and bolstering power in the Indian Ocean, regional security is strengthened through collaborations like ASEAN, IORA and the Malabar Exercises.

India's Role in International Organizations and Diplomacy

1. **UN Engagement** – India is a fervent supporter of multilateralism and actively engages in UN peacekeeping, climate negotiations and the rights of developing nations. It has also put in a proposal for a permanent seat on the UN Security Council.

2. **BRICS and Emerging Economies** – Within BRICS, India advocates for global governance reforms while advancing commerce, development and political cooperation.

3. **Climate Leadership** – Leading the International Solar Alliance and striving for 500 GW of non-fossil fuel energy by 2030, India is a major actor in global climate policy.

4. **Economic Influence** – India, a significant global economy, is a key player in the WTO and WEF, concentrating on investment, trade growth and economic diplomacy.

5. **Strategic Alliances** – India plays a vital role in Indo-Pacific security through the Quad and fortifies international links in trade, technology and defense through alliances with the US, Russia, Japan and the EU.

CHALLENGES AND CRITICISMS

Nationalism has the potential to propel advancement, but it may also pose serious obstacles, especially in the areas of economic growth, inclusion and moral policy issues. Minority groups may be marginalized by hyper- nationalism, which erodes multiculturalism and exacerbates tensions between different ethnic, religious and regional groups. The pluralistic basis of India's unity is at danger due to exclusive nationalism, as policies that support particular ideologies may drive minorities out. Around the world, hyper-nationalism has undermined social cohesiveness by causing racial disparity in the United States and worries about refugees and minorities in Europe.

CONCLUSION AND FUTURE OUTLOOK

The combination of nationalism and progress continues to be a major topic in forming India's identity and its course for

sustainable growth as the country develops in the twenty-first century. When nationalism is pursued in accordance with the tenets of national development, it can promote social, economic and scientific advancement and build a cohesive community. But for the nation to advance in an inclusive and morally sound manner, this integration necessitates carefully navigating a number of obstacles.

The parts that follow highlight the main conclusions drawn from the investigation of this issue, make suggestions for combining sustainable growth with national pride and give an outlook on India's potential to become a worldwide leader in the future.

India's Future as a Global Leader in Economic, Scientific and Social Progress

India is positioned as a potential global economic powerhouse due to its robust entrepreneurial ecosystem, burgeoning middle class and growing consumer market. Atmanirbhar Bharat and Made in India are two examples of policies that promote domestic innovation, draw in international investment and increase manufacturing. India's standing internationally will be further improved by bolstering the digital economy, IT services, fintech and digital platforms.

India's position as a worldwide innovator is highlighted by its leadership in biotechnology, artificial intelligence and space exploration. India's scientific superiority is demonstrated by projects like Mangalyaan and Chandrayaan and its technological supremacy is further cemented by developments in cybersecurity and digital infrastructure.

Reducing inequality, enhancing healthcare and promoting education are all essential to sustainable growth. India's influence is increased by its diplomatic initiatives through the UN, BRICS and international alliances. Addressing health issues, geopolitical challenges and climate change effectively will bolster India's standing as a major world leader.

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URDU-HINDI CINEMA: A SOCIAL CATALYST

Naseem Ahmad
Assistant Professor, Department of Urdu, Gandhi Faiz-E- Aam College, Shahjahanpur, U.P.

ABSTRACT:

The Lumière brothers would never have imagined, even in their wildest dreams that the technical art they were inventing would become the biggest catalyst for social change in the world. Urdu-Hindi cinema has been an important part of the history, culture and social consciousness of the subcontinent. Films are not just a source of entertainment but a powerful medium that plays a significant role in shaping public thought, attitudes and social values. Over time, Urdu-Hindi cinema not only highlighted social problems but also drew attention to their solutions. In this article we will examine various aspects of cinema that have been effective in social change.

Key Words: Urdu, Hindi, social change, cinema, films

INTRODUCTION:

"In the courtroom scene, camera zooms in on a wife and husband and then frames the entire room with the judge, where a wife and husband are discussing divorce. The judge makes the couple think again and advises that they must watch the movie Talaq before reaching any decision. This film had such a profound effect on both of them that they rejecedt the intention of their divorce."

Alfred Hitchcock once said, "The length of a film should be directly related to the endurance of the human bladder."

Indian cinema is the biggest film industry in the world. Erum Hafeez remarks:

"Bollywood is recognized as the largest film-producing industry in the world. India produced a total of 2961 films including1602 feature films in 2012 alone."1

Periodic Sketch of Urdu-Hindi Cinema

1913-1940: From silent films to social reform"

Films during this period were mainly based on religious and mythological stories, but also gave space to social reforms. Nehruvian socialism and Gandhian philosophy became part and parcel of our cinema.

1940-1960's period was filled with India's independence and the social issues that followed. Mother India (1957) - A film that highlighted the sacrifice of a mother and the hardships of farmers. Do Bigha Zameen (1953) - A film that highlighted poverty, the landlord system and the problems of the working class. Nokar (1954) is a film that highlighted the gap between the rich and the poor.

1960-1980: Modernity, Rebellion and Struggle for Justice

This was a period of rebellion against the traditional social structure. The role of the Angry Young Man (Amitabh Bachchan) gained popularity in films. Zanjeer (1973) is a film that raised its voice against corruption. Devar (1975 is a film based on the social aspects of class division and crime. Amar Akbar Anthony (1977) proves to be an exemplary film on religious harmony and secularism.

1980-2000: Neoliberalism, women's rights and civic issues

In this period, films shed light on women's liberation, issues of civic life and new social changes. Earth (1982) was a path breaking film based on women's autonomy and their rights after marriage.

- Roti Kapra Aur Makan (1974) - Basic needs and the struggle of the middle class.
- Hum Aap Ke Hain Koon (1994) - A film based on family values and cultural traditions.
- Sarfarosh (1999) - A film on themes of terrorism and patriotism.

2000-2024: Globalization, modern issues and the voice of youth

In the new century, films have shed more light on social issues such as gender equality, education, and corruption and

LGBTQ+ rights.

- Lagaan (2001) - Colonial oppression and rebellion through sports.
- Taare Zameen Par (2007) - A film that sheds light on the issues of special children and the education system.
- Chak De India (2007) - A film based on women's participation in sports and national identity.
- Piku (2015) - A film on the theme of women's autonomy and parental care.
- Padmaavat (2018) - A reflection of historical and cultural values.
- Gully Boy (2019) - A film that sheds light on youth struggles, class differences and hip-hop culture.
- The Kashmir Files (2022) - Issues of Kashmiri Pandits in a political and historical context.

ANALYSIS:

It is commonly cited that after the First World War some of the highest and most excellent anti-war films were made and screened, but soon after, the Second World War gripped the entire international community. But there is no doubt that a big-screen movie in a pitch-dark room has a profound effect on the people and creates a strange chemical bond between screen and audience.

One of the most renowned film critics, Firoze Rangoonwala has said:

"Cinema by its nature is a manipulator. Apart from visual and oral wonders it can create its existence depends on exploiting emotions, relationships, traditions, religion, sex and most of the virtues and vices, which related to human senses and sensibilities. In a good film this is done aesthetically, purposefully and in a bad film it is managed by market rules."2

Religious, Mythological and Socilal Films:

Dada Sahab Phalke made the first Indian film Raja

Harishchandra (1913) inspired by "Life of Christ". It was the first Indian silent film, which was based on religious morality. Santhakali (1929) is a film that shed light on the caste system and the exploitation of women. Aachit Kanwar (1930) is another film based on the rights of widows.

According to renowned film critic Gautam Kaul:

"The first 20 years of Indian Cinema saw a mass education of Indian audience on their mythological history and once those subjects were exhausted, the national debate of social ills commenced…"3

Hindi Cinema has one more indirct achievement to its credit - It has always broken the boundaries of language and made itself known in every corner of the world. Hindi films not only spoke of the country's culture and language, but also incorporated various languages and local dialects. Thus, cinema has become a bridge that connects different languages, cultures and backgrounds.

In today's era, the Hindi film industry has made its mark in the global markets. From Hollywood, to the Middle East, South Asia and Europe, Hindi films are spreading. Film makers and actors also use local languages in their stories, which is easy for the general audience to adopt.

And, digital platforms like Netflix and Amazon Prime are also fueling this trend. These platforms offer local content with Hindi and English subtitles, reducing the language barrier and allowing people to watch content in languages other than their own.

Prem Pal Ashk says:

مرزا رسوا کا ناول امراو جان ادا پڑھکر لکھنئو کے چوک بازار میں امرائو جان کا کوٹھا تلاش کرنے والے خال خال ملیں گے مگر ایک فلم دیکھ کر نفسیاتی اثرات قبول کرنے والے کروڑوں افراد ہیں۔

(Trans:After reading Mirza Riswa's novel Amrao Jaan Aada, there will be few people looking for Amrao Jaan's house (brothel) in Lucknow's Chowk Bazaar, but there are millions of people who accept the psychological effects of watching a movie.)4

پریم چند نے بھی سنیما کی اہمیت و افادیت محسوس کی تھی۔ ان کا کہنا ہے " وہاں(ممبئی)جانے میں خاص فائدہ ہوگا۔ ناول اور کہانیاں لکھنے سے جو نہیں ہو رہا ہے وہ فلموں میں دکھانے سے ہو سکیگا۔ کیہانیوں اور ناولوں سے صرف انھیں ہی فائدہ ہو تا ہے جو انھیں پڑتے ہیں مگر فلموں کے ذریعے ہر جگہ کے لوگ فائدہ اٹھا پائیں گے۔

(Trans. Premchand also felt the importance and utility of cinema. He says, "Going there (Mumbai) will be of great benefit. What is not happening by writing novels and stories can be done by showing them in films. Stories and novels only benefit those who read them, but films can benefit the people from everywhere.)5

1940-1960: Independence, Patriotism and Social Realism

Woody Allen is of the opinion, "Cinema is like a language; it has its own grammar and vocabulary." The director is known as the captain of the ship. He presents his film like a novelist sketches his characters.

Dr. Vikas Shah writes on the impact of Cinema by saying that:

"Cinema has become a powerful vehicle for culture, education, leisure and propaganda. In a 1963 report for the United Nations Educational Scientific and Cultural Organization looking at Indian Cinema and Culture, the author (Baldoon Dhingra) quoted a speech by Prime Minister Nehru who stated, "…the influence in India of films is greater than newspapers and books combined." Even at this early stage in cinema, the Indian film-market catered for over 25 million people a week- considered to be just a 'fringe' of the population." …. During the Second World War movies in the USA created a feeling of valour and heroism in what we were doing and you saw this in films that came out at the time such as the Purple Heart.6

Cinema and Social Awareness

Urdu-Hindi cinema has always played an important role in shedding light on social issues. In the fifties and sixties, films highlighted traditional values and family ties, while later films emphasized modern social issues such as poverty, unemployment, corruption, gender equality and religious harmony. **Jean-Luc Godard has rightly said,** "A film should be like a stone thrown into a pond; it should create ripples."

1. Poverty and class disparity

Cinema has always taken the themes of class disparity and poverty seriously. Films like Do Bigha Zameen (1953) and Mother

India (1957) brought to light economic inequality and the plight of farmers. Similarly, Salaam Bombay (1988) highlighted the lives of poor children in cities and their exploitation.

2. Corruption and Systemic Corruption

In the seventies and eighties, resistance to corruption was presented as a prominent theme in films. Amitabh Bachchan's films like Zanjeer (1973) and Shahenshah (1988) raised voices against social injustice and corruption.

3. Women's Rights and Gender Equality

Women's rights and their issues have been presented from different angles in Urdu Hindi cinema. Films like Bandani (1963), Arth (1982) and Queen (2014) depicted the struggle of women. A recent film Pink (2016) emphasized women's freedom and their right to make decisions.

The 1997 film, coordinated by Kalpana Rajimi, is set in Mumbai (Bollywood) in the late 1940s. The film is about the adventures of Mazdin's pseudonym Imi, brought into the world as a Hijra, and his family denied that he is a Hijra.7

4. Minority Issues and Religious Harmony

Films like Dharmaputra (1961) and Aman (1968) highlighted interfaith tolerance. While, Mera Naam Joker (1970) highlighted human emotions and harmony. Bombay (1995) took the subject of communal riots and showed its impact.

5. Youth Awareness and Politics

Films like Rang De Basanti (2006) and Ganga Jal (2003) were successful in awakening political consciousness among the younger generation. These films highlighted the importance of fighting against injustice and corrupt systems.

Cinema and Cultural Change

Rohan Potdar writes:

"Film-making has a transformative power which can be a beautiful and an eye-opening tool for bringing about social impact." 8

Cinema not only highlighted social issues but also helped in cultural change. While in the past, traditional values and family ties were emphasized, in the modern era, themes such as personal freedom, new definitions of love, and equality in marital relationships became prominent.

1. Family Values and Changes

In the fifties and sixties, films like Mughal-e-Azam (1960) and Waqt (1965) highlighted the centrality of the family. But in modern times, films like Baghban (2003) and Kabhi Khushi Kabhi Gham (2001) showed changing family attitudes.

2. New Trends in Love and Marriage

Where interfaith marriages were once considered taboo, cinema helped change this view. Films like Bombay (1995) and Wake Up Sid (2009) promoted new ideas.

3. Modern Lifestyle and Young Generation

Films like Zindagi Na Milegi Dobara (2011) and Di Lang Bai Sky (2022) introduced new perspectives on life, freedom and choices for the young generation.

Cinema and National and Political Consciousness

Urdu-Hindi films have always worked for political and social awareness. Films made before and after independence highlighted patriotism and national unity.

1. Freedom Struggle and Patriotism

Nationalism was instilled in the films of the pre-independence period of Pakistan and India. Films like Shahjahan (1946) and Kranti (1981) taught patriotism.

2. Modern Political Issues

Films like Chak De India (2007) and Makala (2018) shed light on modern political and social issues.

Concept of love and affection

And last but not least the concept of love and affection, which is core to the theme of every film:

"Taqdeerein badal jaati hai, zamana badal jaata hai, mulkon ki tarikh badal jaati hai, Shahenshah badal jaate hai … magar is badalti hui duniya mein mohabbat jis insaan ka daaman thaam leti hai … woh insaan nahi badalta"

This beautiful dialogue belongs to the cult movie Mughal-e-Azam. Its English translation would be, "Destinies change, eras change, dates of countries change, Kings change … but in this changing world if love stays with someone … then that person does not change" Mughal-e-Azam is considered as a benchmark in the history of Indian cinema.9

Ermina Reyaz points out the significance of Urdu by saying:

The reason why Urdu has such a strong impact on Bollywood is because of its elegance, beauty and decency. It is a language of manners, modesty and respect and is hence pleasant to the ears. It is the language in which emotions such as love, intoxication and sorrow are best expressed and this is why many of the best Bollywood songs and dialogues have been written in Urdu.10

CONCLUSION:

The history of Urdu Hindi cinema spans over a century. From Dadasaheb Phalke's first film Raja Harishchandra in 1913 to 2024, cinema has not only provided entertainment but also played a significant role in raising social awareness, challenging conventions and promoting new ideas. Urdu-Hindi cinema has, over time, shed light on various social issues and awakened public consciousness. It plays an important role in social change, reform and development. Cinema should continue its positive contribution to further social development in the future as well. In Nadine Labaki's words, "Cinema is not only about making people dream. It's about changing things and making people think."

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A STUDY: THE CONTRIBUTION OF INDIANS TO SCIENCE AND TECHNOLOGY FROM ANCIENT VEDIC PERIOD TO MODERN ERA

Raju, Seema Teotia, and Amandeep Singh
Dept of Physics, Govt. Raza PG College, Rampur, U.P., India
Author Email: rajphysicsgdc@gmail.com

ABSTRACT

The Indian civilization ranks among the oldest in the world. It has a rich heritage of science and technology. Ancient India fostered sages and visionaries and nurtured scholars and scientists. Research indicates that India significantly contributed to scientific and technological advancements long before the establishment of contemporary laboratories, from producing the finest steel globally to introducing the concept of numerical counting. Numerous theories and techniques developed by ancient Indians have laid the groundwork for modern science and technology. India has been a cradle of knowledge and innovation for millennia, contributing significantly to various fields of science and technology. From the advancements of the ancient Vedic period to modern-day innovations, Indian scholars and scientists have played a crucial role in shaping global scientific thought. This research paper explores the evolution of scientific and technological progress in India, tracing its contributions from ancient times to the modern era, supported by references to historical texts, academic studies, and scientific publications.

Key Word: Mathematics, Algebra, Trigonometry, Medicine, Surgery, Astronomy, Zero, Decimals, Annu, Astrology, Scattering, Missile.

INTRODUCTION

Scientific and technological advancements in India date back to ancient civilizations, with significant contributions in mathematics, astronomy, medicine, metallurgy, and engineering. The development of these disciplines laid the foundation for modern advancements, making India a key player in global scientific progress. This paper examines the contributions of Indian

scholars, engineers, and scientists across different eras, substantiating claims with documented research.

Ancient Contributions

Rishi Kanada:

Rishi Kanada was an ancient Indian (600 BCE to 200 BCE, though exact dates remain uncertain) sage and philosopher who founded the **Vaisheshika school of philosophy**, one of the six classical schools of Hindu philosophy. He is best known for his pioneering work in **atomic theory (Paramanuvada)**, which laid the foundation for later scientific developments in India. "*Kanada proposed that* ***matter is composed of indivisible particles*** *called paramanus (atoms)*". The atom is also mentioned in the Bhagavad Gita (chapter 8).

Varāhamihira (505 CE – 587 CE):

Varāhamihira was an eminent Indian astronomer, mathematician, and astrologer of the Gupta period. He made significant contributions to astronomy, astrology, and mathematics, and his works played a crucial role in shaping early Indian and global scientific thought. Key contribution of Varahamihira in Astronomy and Astrology gives Panchasiddhantika ("The Five Astronomical Canons") , Brihat Samhita ("Great Compilation") - vast encyclopedic text about astronomy, weather forecasting, earthquake prediction, astrology, architecture, and hydrology. Brihat Jataka- most authoritative texts on Hindu astrology (Jyotish).

Aryabhata (476–550 CE):

Aryabhata was one of ancient India's greatest mathematicians and astronomers. He made groundbreaking contributions to mathematics, astronomy, and trigonometry, influencing both Indian and global scientific thought. His most famous work, the Aryabhatiya, laid the foundation for many mathematical and astronomical principles still in use today.

Main Contributions of Aryabhata-in Mathematics Concept of Zero and Place Value System is credited with developing the concept of zero, which revolutionized arithmetic and algebra. Aryabhata estimated π H" 3.1416, remarkably close to the modern

value. He stated that π (Pi) is irrational, centuries before it was formally proved.

In Trigonometry Innovations-Defined sine (jya), cosine (kojya), and versine (utkrama-jya) functions, which became the foundation for modern trigonometry.

In Astronomy Heliocentric Ideas -Proposed that Earth rotates on its axis, explaining the apparent movement of stars.Suggested that the Moon and planets shine due to reflected sunlight.Calculated the length of the solar year as 365.358 days, very close to the modern value. Estimated the Earth's circumference as 39,968 km, remarkably accurate compared to the actual value (40,075 km).

Eclipse Predictions-Explained lunar and solar eclipses scientifically, attributing them to the Earth's and Moon's shadows instead of mythological causes. In 23 years old Aryabhata wrote, f 118 verses covering mathematics and astronomy. The Aryabhata satellite, India's first satellite (launched in 1975), was named in his honor.

Brahmagupta (598 CE – 668 CE): Brahmagupta was a renowned Indian mathematician and astronomer from the **7th century**, best known for his contributions to **algebra, arithmetic, geometry, and astronomy**. His most famous work, the **Brahmasphutasiddhanta**, introduced **zero as a number** and formulated rules for negative numbers and arithmetic operations.

Main Contributions of Brahmagupta

Mathematics-Introduction of Zero and Negative Numbers: Defined zero (0) as a number and established rules for operations involving zero. Stated that any number divided by zero is undefined, a concept that remains true today. Extended arithmetic to include negative numbers, treating them as debts.

Algebra and Quadratic Equations: Provided solutions to quadratic equations using a general formula, predating European algebraic methods by centuries.Introduced the Brahmagupta's identity, a method to generate Pythagorean triples.

Arithmetic Progressions: Gave formulas for the sum of

series, squares, and cubes of numbers. Astronomy- improved calculations for planetary motions, eclipses, and the length of a year (estimated as 365.25 days, very close to modern values). Proposed a geocentric model of the universe, which was later challenged by heliocentric theories.

Bhaskara-I (600 CE – 680 CE): Bhaskara I was an Indian mathematician and astronomer, known for his work on algebra, trigonometry, and number systems. He was an ardent follower of Aryabhata and helped popularize Aryabhata's mathematical ideas.

Main Contributions of Bhaskara-I are Commentary on Aryabhata's Work- Write the detailed commentary on Aryabhatiya, Gave an accurate sine function approximation, improving trigonometric calculations.Work on Place Value System Strengthened the understanding of the Hindu-Arabic numeral system.

Bhaskara-II (Bhaskaracharya) (1114 CE – 1185 CE): Bhaskara II, also known as Bhaskaracharya, was one of the greatest Indian mathematicians and astronomers of the 12th century. He made major advancements in algebra, calculus, trigonometry, and planetary motion.

Key Contributions of Bhaskara II-

Mathematics- Early Concept of Calculus- Introduced differential and integral calculus, predating Newton and Leibniz by centuries. Used calculus to calculate planetary motions and solve astronomical problems.Developed solutions for Diophantine equations, known as the *Chakravala method*. Worked extensively on continued fractions and permutations.Provided exact values for sine, cosine, and other trigonometric functions.

Astronomy-Calculated planetary positions, eclipses, and Earth's rotation speed.Stated that the Earth attracts objects downward, an early hint at gravitational concepts.

Charaka (c. 100 BCE – 200 CE): Charaka was an ancient Indian physician and scholar known as the Father of Indian Medicine. He was the principal author of the Charaka Samhita, one of the most important texts in Ayurveda (traditional Indian

medicine). His contributions laid the foundation for modern medicine, focusing on diagnosis, treatment, and preventive healthcare.

Key Contributions of Charaka

Charaka Samhita (The Foundation of Ayurveda)-One of the earliest and most comprehensive medical treatises in history. Covers physiology, pathology, diagnosis, treatment, and pharmacy. Describes over 1,500 medicinal plants and their uses. Divided into eight sections (Ashtanga Ayurveda), including internal medicine, surgery, pediatrics, and toxicology.

Contributions to Medicine-Emphasized preventive healthcare, diet, and lifestyle for disease prevention.

Concept of Digestion and Metabolism-Introduced Agni (digestive fire) and Tridosha (Vata, Pitta, Kapha), which remain central in Ayurveda today.

First Concept of Immunity (Ojas)-Described Ojas, a vital energy responsible for immunity and overall health.

Contributions to Anatomy and Physiology- Detailed descriptions of body organs, tissues, and physiological functions. Suggested that blood circulation is vital for health, a concept later proven by Western medicine.

Sushruta (circa 600 BCE – 500 BCE):

Sushruta was an ancient Indian physician and surgeon, often called the "*Father of Surgery*". His work, the Sushruta Samhita, is one of the most comprehensive ancient medical texts, covering surgical techniques, medicinal plants, anatomy, and medical ethics. His contributions laid the foundation for modern surgery and medicine.

Key Contributions of Sushruta

Sushruta Samhita (The First Surgical Textbook)- One of the oldest and most detailed medical texts, covering surgery, medicine, anatomy, pharmacology, and toxicology. Describes over 1,120 medical conditions, 700 medicinal plants, and 120 surgical instruments. Focuses on patient care, hygiene, and recovery,

principles still followed in modern medicine.

Contributions to Surgery- Plastic Surgery (Rhinoplasty – Nose Reconstruction), Cataract Surgery, Cesarean Section and Obstetrics, Discussed safe childbirth techniques and postnatal care,one Setting and Fracture Treatment, Introduced methods for bone realignment, splints, and wound care.

Use of Surgical Instruments- Designed over 120 surgical instruments, including scalpels, forceps, and probes**.**

Anesthesia-Used herbal extracts to reduce pain during surgery, an early form of anesthesia.

Contributions to Anatomy and Physiology**,** Human Dissection, Detailed Study of Body Organs,

Metallurgy:

- Iron Pillar of Delhi: This 1,600-year-old structure remains rust-free, showcasing India's early advancements in metallurgy and corrosion-resistant materials.
- Wootz Steel: Ancient India developed high-quality steel, known as Wootz steel, which was used in Damascus swords and influenced metallurgy worldwide.

Architecture and Engineering:

- Advanced Water Management Systems: Stepwells, canals, and sophisticated irrigation techniques were developed to optimize water usage.
- Temple Architecture: The Brihadeeswarar Temple and Konark Sun Temple exhibit intricate engineering and artistic precision.

Modern Era:

C.V. Raman (Chandrasekhara Venkata Raman)(1888-1970): C.V. Raman was an Indian physicist best known for discovering the Raman Effect, which describes the scattering of light and the change in its wavelength when it passes through a transparent medium. Discovered the Raman Effect, fundamental in spectroscopy. This discovery earned him the Nobel Prize in Physics in 1930, making him the first Asian to win a *Nobel Prize*

in science. We celebrate National Science Day (Feb 28) in India to honors his discovery of the Raman Effect

Har Gobind Khorana (1922-2011): Har Gobind Khorana was an Indian-American biochemist famous for his work in genetic code and nucleic acids, which earned him the *Nobel Prize* in Physiology or Medicine in 1968 and National Medal of Science (USA, 1987). He shared the Nobel prize with Marshall W. Nirenberg and Robert W. Holley for their research on how nucleotides form the genetic code that dictates protein synthesis in cells. He Deciphered the genetic code, First to synthesize an artificial gene in a laboratory (1970), Contributed to research in RNA, DNA, and genetic engineering

Subrahmanyan Chandrasekhar (1910-1995): Subrahmanyan Chandrasekhar was an Indian-American astrophysicist best known for his work on stellar evolution and black holes. He won the Nobel Prize in Physics in 1983 for his theoretical studies on the structure and evolution of stars. The Chandra X-ray Observatory, launched by NASA in 1999, is named in his honor.He Awarded the National Medal of Science (USA). Major Contributions of Subrahmanyan Chandrasekhar Discovered the Chandrasekhar Limit (the maximum mass of a white dwarf, ~1.4 times the Sun's mass).He showed that stars heavier than this limit collapse into neutron stars or black holes instead of becoming white dwarfs. He contributes Pioneered research in stellar structure, radiative transfer, and general relativity

Venkatraman Ramakrishnan (1952) : Venkatraman "Venki" Ramakrishnan is an Indian-American structural biologist who won the Nobel Prize in Chemistry in 2009 for his groundbreaking work on the structure and function of the ribosome. He shared the prize with Thomas Steitz and Ada Yonath for their research that helped reveal how ribosomes translate genetic code into proteins.

His Major Contributions Determined the atomic structure of the ribosome using X-ray crystallography. Advanced knowledge of protein synthesis and how genetic information is translated. He Served as President of the Royal Society (2015-2020).His work has had a huge impact on molecular biology, medicine, and drug

discovery

Sir Shanti Swaroop Bhatnagar (1984-1955): Sir Shanti Swaroop Bhatnagar was an Indian scientist, chemist, and institution builder who played a key role in developing scientific research in India. He is known as the *"Father of Research Laboratories"* in India for establishing several national laboratories. He Established the Council of Scientific and Industrial Research (CSIR) in 1942. He Founded 12 national research laboratories in India. He developed processes for petroleum refining, water treatment, and industrial chemistry. He encouraged scientific research for industrial applications. Indian Govt. Awarded him *Padma Bhushan (1954)***.** India's most prestigious award Shanti Swarup Bhatnagar Prize for Science and Technology for scientists named in his honor. His contributions laid the foundation for India's modern scientific and industrial research.

Homi Jehangir Bhabha (1909-1966): Homi J. Bhabha was an Indian nuclear physicist and the father of India's nuclear program. He played a crucial role in establishing India's atomic energy research and policy. His visionary leadership helped India develop nuclear power for peaceful purposes while also laying the groundwork for future advancements in defense. He Proposed the Bhabha Scattering Theory (explains electron-positron interactions), Pioneered India's nuclear energy program, Established the Tata Institute of Fundamental Research (TIFR) in 1945, Founded the Bhabha Atomic Research Centre (BARC) in 1954 and Advocated the three-stage nuclear power program for India.Indian Govt. Awarded him Padma Bhushan (1954). Indian Govt. provide The Homi Bhabha Fellowship encourages research in science and technology. His untimely death in a plane crash in 1966 remains controversial.

Sir MokshagundamVisvesvaraya (1861-1962): Sir M. Visvesvaraya was an Indian engineer, statesman, and nation-builder known for his contributions to irrigation, water resource management, and industrial development in India. He is celebrated as one of India's greatest engineers and was instrumental in modernizing India's infrastructure. His Major Contributions he Designed automatic floodgates for the Krishna Raja Sagar (KRS)

Dam in Karnataka, Developed irrigation and drinking water systems across India. He Played a key role in the industrialization of Mysore State (now Karnataka).He Founded institutions like State Bank of Mysore and Hindustan Aeronautics Limited (HAL),He Advocated for technical education and planned economic growth. For his contribution India's highest civilian honor *Bharat Ratna* Awarded in 1955.in his honor we celebrated Engineers' Day (September 15) in India .His visionary engineering and administrative skills helped shape modern India's infrastructure, education, and industrial growth.

Venkatraman Radhakrishnan (1929-2011): Venkatraman Radhakrishnan was an Indian astrophysicist and space scientist known for his pioneering research in radio astronomy and space technology. He made significant contributions to our understanding of interstellar clouds, pulsars, and galaxy formation. He studied the structure of interstellar clouds and magnetic fields in galaxies, Contributed to research on pulsars, quasars, and radio waves from celestial bodies, and Worked on lightweight aircraft and sailboats using innovative engineering methods. He Helped develop India's radio astronomy program. He was also known for his passion for engineering and design, applying scientific principles to various fields beyond astronomy.

Satyendra Nath Bose (1894-1974): Satyendra Nath Bose was an Indian physicist and mathematician best known for his work on quantum mechanics and Bose-Einstein statistics. His research on bosons (a class of subatomic particles) laid the foundation for modern particle physics. He Developed Bose-Einstein Statistics, which describes the behavior of particles known as bosons. His 1924 paper on photon statistics was endorsed by Albert Einstein, leading to the concept of Bose-Einstein Condensate. He Contributed to X-ray crystallography, unified field theory, and statistical mechanics. Indian Govt. Awarded him Padma Bhushan in 1954. The term **"Boson"**, used in particle physics, is named after him. His work led to *Bose-Einstein Condensate (BEC)*, a new state of matter discovered in 1995.His work remains fundamental in quantum physics, impacting fields like superconductivity, quantum computing, and particle physics.

Meghnad Saha (1893-1956): Meghnad Saha was an Indian astrophysicist who is best known for developing the Saha Ionization Equation, which helped explain the physical and chemical conditions of stars. His work played a crucial role in understanding stellar atmospheres and their composition. He developed the Saha Ionization Equation in 1920, which links the temperature and pressure of a star to its ionization and the spectral lines emitted by elements in its atmosphere. This helped in the classification of stars.His study Played a significant role in understanding thermal ionization in astrophysical contexts.He Contributed to the development of plasma physics,he Introduced the concept of the interstellar medium in star formation. For his contribution Indian Govt. Awarded him Padma Bhushan in 1954.His pioneering work in stellar spectroscopy and ionization theory laid the foundation for later discoveries in stellar evolution and astrophysics.

Srinivasa Ramanujan (1887-1920): Srinivasa Ramanujan was an Indian mathematician who made extraordinary contributions to mathematics, particularly in the fields of number theory, infinite series, and mathematical analysis. His work continues to inspire mathematicians and has had a lasting impact on various areas of mathematics, including modular forms and partition theory.He Developed the Ramanujan-Hardy number (the number 1729), Ramanujan's work on partition theory has influenced modern mathematics and computer science, Ramanujan primes, Ramanujan's tau function, and Ramanujan's conjecture.The Ramanujan Prize for Young Mathematicians is awarded in his honor.

Sir Jagadish Chandra Bose (1858-1937): Sir Jagadish Chandra Bose was an Indian scientist, biologist, physicist, and inventor who is considered one of the pioneers in the fields of radio and microwave optics. He made groundbreaking contributions to the understanding of plant physiology and the science of radio waves, and he is often regarded as one of the founding figures of modern science in India.His Major Contributions in Radio and Microwave Optics, Plant Physiology, Bose-Einstein Condensate, Development of Wireless Communication. Indian Govt awarded Padma Bhushan in 1954.

Bose was highly respected for his ability to combine experimental research with philosophical and cultural thinking, and his work bridged both the physical sciences and biological sciences.

Vikram Sarabhai (1919-1972): Vikram Sarabhai was an Indian physicist and space scientist who is widely regarded as the father of the Indian space program. His visionary leadership and dedication played a key role in establishing India as a space power. His Major Contributions in Indian Space Program: Sarabhai played a pivotal role in establishing the Indian National Committee for Space Research (INCOSPAR) in 1962, which later became the Indian Space Research Organisation (ISRO). Development of Satellite Technology, Space for Societal Benefits. India's highest civilian honors Padma Bhushan awarded in 1966.Sarabhai was a visionary scientist and leader who believed that space technology could contribute to the national development and the betterment of humanity, and his work in space science continues to impact the world today.

APJ Abdul Kalam (1931-2015): Dr. Avul Pakir Jainulabdeen Abdul Kalam, popularly known as APJ Abdul Kalam, was an Indian aerospace scientist and the 11th President of India. Widely respected as a national hero, he is often called the "Missile Man of India" for his pivotal role in India's missile and nuclear programs. He is celebrated not only for his contributions to science and technology but also for his inspiring leadership, vision for India's future, and his unwavering dedication to the country's development. Dr. Kalam was instrumental in the development of India's missile defense systems, including the Agni and Prithvi missiles. His work in missile technology earned him the title of the Missile Man of India.He played a significant role in India's nuclear tests in 1998 (Pokhran-II), which made India a nuclear power.Dr. Kalam envisioned an empowered India by 2020, focusing on the development of rural infrastructure, technology, education, and energy.Dr. Kalam was involved in the Indian Space Research Organisation (ISRO), contributing to satellite launch vehicles and the SLV-3, which successfully placed India's first satellite Rohini into orbit.Dr. Kalam was awarded India's highest civilian honor Bharat Ratna in 1997 for his immense contributions to science, technology, and nation-building.He was affectionately called the

People's President for his approachable nature, passion for education, and interactions with the public, especially students.After his presidency, he remained deeply involved in academia and youth development, giving speeches and working with institutions to foster innovation.

Dr. APJ Abdul Kalam's legacy is one of excellence in scientific achievement, leadership with integrity, and an unwavering belief in the potential of India's youth. He remains a role model and a symbol of scientific innovation, hard work, and dedication.

CONCLUSION

India's contributions to science and technology span thousands of years, influencing fields as diverse as mathematics, medicine, and space exploration. The country's rich scientific heritage continues to inspire new generations of researchers and innovators. With advancements in AI, space exploration, and biotechnology, India remains at the forefront of global scientific progress.

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ADVANCES IN IONIC LIQUIDS: SYNTHESIS, APPLICATIONS, AND FUTURE PERSPECTIVES

Amzad Khan[1], Shakeel Ahmad[1], Mohd Kamil Hussain[1], Rahul Kumar[1] and Mudit Singhal[1]
[1] Govt Raza Post Graduate College, Rampur (U. P.)-
Email:mzcy47@gmail.com

ABSTRACT

Ionic liquids (ILs), often termed "designer solvents," have emerged as versatile materials with tunable physicochemical properties. This review provides a comprehensive overview of recent advances in IL synthesis, their diverse applications across industries, and challenges in scalability and sustainability. Emphasis is placed on green chemistry principles, novel synthetic strategies, and cutting-edge applications in energy storage, catalysis, and biotechnology.

INTRODUCTION

Approximately a century ago, Paul Walden identified a novel class of materials through the discovery of ethyl ammonium nitrate ([EtNH*f*][NO*f*]), [1] which exhibited remarkable physical properties. This substance is now recognized as one of the earliest documented **ionic liquids (ILs)**. Defined as salts composed of asymmetric organic cations paired with organic or inorganic anions, ionic liquids are characterized by melting points below 100°C [2]. Their unique attributes—such as negligible volatility, high thermal stability, and tunable solubility—have positioned them as innovative fluids with diverse applications. These include use as electrolytes in energy storage systems [3-6], solvents in organic synthesis and pharmaceutical catalysis, media for CO, capture, agents in diesel fuel desulfurization, and lubricants in tribological applications [7,13].

Categorizing ionic liquids is inherently complex due to their structural diversity. A common approach classifies them based on the **cation type**, wherein the positive charge resides on nitrogen, phosphorus, sulfur, or oxygen atoms. This yields four primary

categories: ammonium, phosphonium, sulfonium, and oxonium ionic liquids. Among these, ammonium and phosphonium derivatives are most prevalent. Variations in cation structure—such as alkylammonium, imidazolium, pyridinium, guanidinium, and cholinium ions—further expand their diversity. Anions range from simple halides (e.g., Cl{ , Br{) to complex species like bis(trifluoromethanesulfonyl)amide ([NTf,]{), tetrafluoroborate ([BF,,]{), hexafluorophosphate ([PF†]{), and nitrate ([NO*f*]{), among others (see Figure 1). This vast chemical versatility enables precise tailoring of IL properties for specific applications, underscoring their significance across scientific and industrial fields.

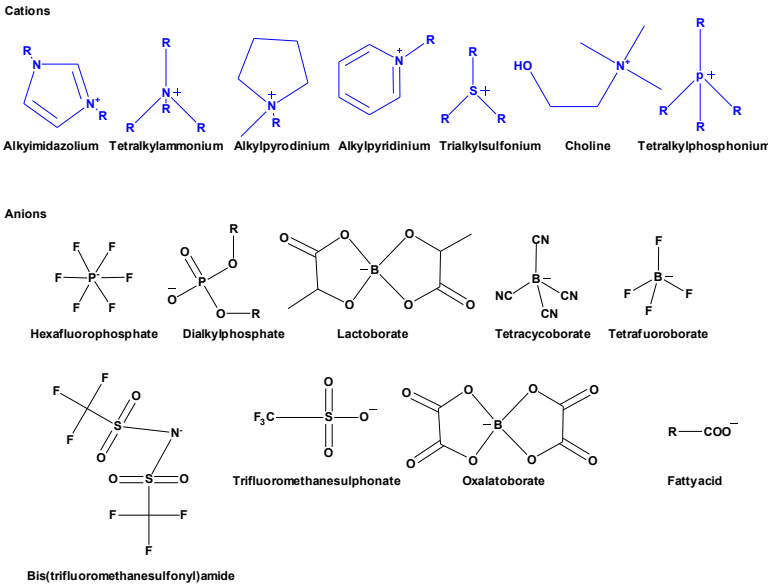

Fig. 1: Chemical structure of commonly used cations and anions of variable ionic liquids.

2. Synthesis of Ionic Liquids

2.1 Traditional Method

1. Metathesis Reactions:

Halide salts (e.g., [BMIM]Cl) treat with metal salts (e.g., AgNO*f*) to form ionic liquids like [BMIM]NO*f* .

Boundaries: Byproduct removal (e.g., AgCl) rises cost.

2. Acid-Base Neutralization:

Direct reaction of amines with acids (e.g., [HDBU][TFSI]).

Advantages: Solvent-free, high purity.

2.2 Green Synthesis Approaches

1. Microwave-Assisted Synthesis:

Rapid heating decrease's reaction time (e.g., [EMIM]Br in nearly10 minutes).

2. Biobased ILs:

Derived from renewable sources (e.g., choline-based ILs).

2.3 Functionalization

- **Task-Specific ILs**: Incorporation of functional groups (e.g., -SO*f* H for acid catalysis).
- **Polymeric ILs**: Improve mechanical stability for membrane applications.

Table 1: Comparison of IL synthesis methods.

Method	Advantages	Limitations
Metathesis	High yield	Costly byproduct removal
Acid-Base Neutralization	Solvent-free, simple	Limited anion/cation options
Microwave	Energy-efficient, fast	Scalability challenges

3. Applications of Ionic Liquids

3.1 Energy Storage

- **Batteries**: ionic Liquids as electrolytes in Li-ion based batteries (e.g., [PYR *f*][TFSI]) recover safety as well as thermal stability [3]
- **Supercapacitors**: High ionic conductivity of ionic liquids

improves charge storage (e.g., [EMIM][BF„]).

3.2 Catalysis

- **Biphasic Systems**: ionic liquids stabilize catalysts (e.g., Ru in [BMIM]Cl in olefin metathesis).
- **CO, Capture**: Amino-functionalized ionic liquids (e.g., [P66614][Pro]) selectively absorb CO, . [14]

3.3 Pharmaceuticals

- **Drug Delivery**: ILs improve solubility of poorly water-soluble drugs (e.g., ibuprofen-IL conjugates). [15]
- **Antimicrobial Agents**: Long-alkyl-chain ILs disrupt bacterial membranes.

3.4 Green Chemistry

- **Solvents in Organic Synthesis**: Replace VOCs in Diels-Alder or Friedel-Crafts reactions.
- **Biomass Processing**: ionic liquids dissolve lignin/cellulose for biofuel production (e.g., [EMIM][OAc]).

4. Challenges and Limitations

- **Cost**: High synthesis costs limit industrial adoption.
- **Toxicity**: Some ILs (e.g., [BMIM][PF†]) exhibit ecotoxicity.
- **Scalability**: Batch synthesis hampers large-scale production.

5. Future Perspectives

1. **Sustainable ILs**: Development of biodegradable, low-toxicity ILs from biomass.
2. **Machine Learning**: Predict IL properties for targeted applications.
3. **Circular Economy**: Recycling strategies for spent ILs in industrial processes.

CONCLUSION

Ionic liquids bridge the gap between molecular solvents

and solid materials, offering unparalleled versatility. While challenges remain, interdisciplinary research will drive innovations in synthesis and applications, positioning ILs as cornerstones of sustainable technology

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CHARACTERIZATION OF DC PLASMA IN CO-AXIAL ELECTRODE GEOMETRY

Rahul Kumar[1*], Mudit Singhal[1], Brahm Singh[1], Amzad Khan[2], Shakeel Ahmad[2] and Surendra Kumar Gautam[3]

[1]Department of Physics, [2]Department of Chemistry, [3]Department of Mathematics, Govt Raza Post Graduate College, Rampur (U.P.)

*Email: rahul.cdhm@gmail.com

ABSTRACT

The electrodes are not planar but they are in the coaxial cylindrical geometry. This geometry ensures that the electric field is radially outwards in a central anode configuration. Thus the electric field experienced by the accelerating electron is not constant. The discharge characteristics and other features may not be same as the planar geometry. The main aim of this work would be to carry out experimental investigations of the plasma characteristics, hysteresis & negative differential resistance (NDR) effects and many nonlinear phenomena in coaxial electrode geometry using appropriate plasma diagnostics and analysis tools in the presence of magnetic field.

INTRODUCTION

In DC glow discharges, due to potential difference between two electrodes (anode and cathode), electrons are accelerate from cathode to anode. If the potential difference is sufficiently high then these accelerating electrons ionize the gas molecules in their way by inelastic collisions. The ions thus produced drift toward the cathode, becoming sources of more electrons by secondary emission when the ions hit the cathode. Thus, glow discharge is a *self-sustaining* discharge with a *cold cathode* emitting electrons due to secondary emission, due to the ion bombardment.

In Rahul et al [1, 2], carried out work in coaxial electrode geometry but the inter-electrode distance between electrodes is small (H" 2.3 cm). This separation is not sufficient for the measurements with spatial variation of LP. We want to explore some observed phenomenon by taking larger separations between the electrodes in the presence of magnetic field. In previous

experiments, the third electrode is used as auxiliary anode to form many complex structures in parallel electrode geometry. Now, we also want to insert a third electrode in between the electrodes in coaxial electrode geometry.

DETAILS OF THE PROPOSAL

Investigations in a co-axial geometry glow discharge (1.5 mm anode and 50 mm cathode) has shown the presence of oscillations and negative differential resistance (NDR) in the discharge characteristics [plot between discharge voltage (V_d) and discharge current (I_d)], usually observed in planar discharges also. However, the novel features observed are a hysteresis, flip in the I_d - V_d characteristics with plasma exposure time coupled with a change in the hysteresis shape of the self-excited oscillation amplitudes. Further, the triggering of the NDR has seen the presence of a transition from an ion sheath to an electron sheath at the anode which is not at all conventionally expected. However these works were observed in a small dimensions system, it is felt that the oscillations observed in smaller dimensions could develop into waves in a larger dimension. Additionally based on some experiments carried out in a plasma discharge, it is felt that the NDR observed in the geometry would behave differently in larger dimensions. Hence studying the co-axial geometry DC discharge in a larger dimension forms the crux of this work. The effect of magnetic field will also be studied, since it is expected to enrich the nonlinearities in the system.

OBJECTIVES

- To study the dimensional scaling of NDR, floating potential oscillations and hysteresis effects in coaxial electrode geometry.
- Effect of magnetic field.
- Effect of an auxiliary anode in the presence and absence of magnetic field.

Since experiments in such configurations were initiated for the first time by our group, it has mainly concentrated in the identification of various interesting aspects of the discharge

behavior associated with a co-axial electrode geometry wherein different avenues of research have opened up for further investigations. Thus the following problems need to be further investigated and will be taken up in future.

The variation of the anode sheath profile as a function of the discharge current leading up to the 1st NDR, along with profile of the plasma parameters, will provide significant information about its evolution as it approaches the triggering point of the NDR. This along with a methodology to allow for controlled profile studies along the 1st NDR, would give a clearer picture of how and why the flip in the anode sheath occurs.

The hysteresis flip has been qualitatively investigated due to absence of any significant profile measurements. This has mainly been attributed to the dimension of the discharge, not allowing for perturbative mechanisms. Hence one needs to revisit these experiments using non-invasive tools, such as fast-ICCD diagnostics, which may throw light to the field profiles also.

Another important aspect observed is the richness in nonlinearities that the system seems to generate with increasing dimensions. This aspect indicates that a characterization of the discharges in identical geometries but with varying anode/cathode radii, such that various physical features become visible to the naked eye, needs to be further investigated. These studies, when carried out from the non-linear perspective, will be able to give a handy tool for prediction of underlying physical phenomena even if it gets submerged in noise levels or coalesced in constricted dimensions.

To understand the different cases, a theoretical model will be developed in this coaxial configuration which would help model the evolution of the discharge characteristics and correlate the nonlinear dynamical measures with that from the theoretical model.

METHODOLOGY TO ACHIEVE OBJECTIVES

The experimental setup (Fig. 1) consists of a coaxial stainless steel electrode system, with the central axial rod being the powered anode and the outer cylindrical tube acting as the grounded cathode. A variable power supply is used and a variable

resistance R is also used for the completion of the circuit. I is discharge current which is flowing in the circuit and V is the discharge voltage between the electrodes.

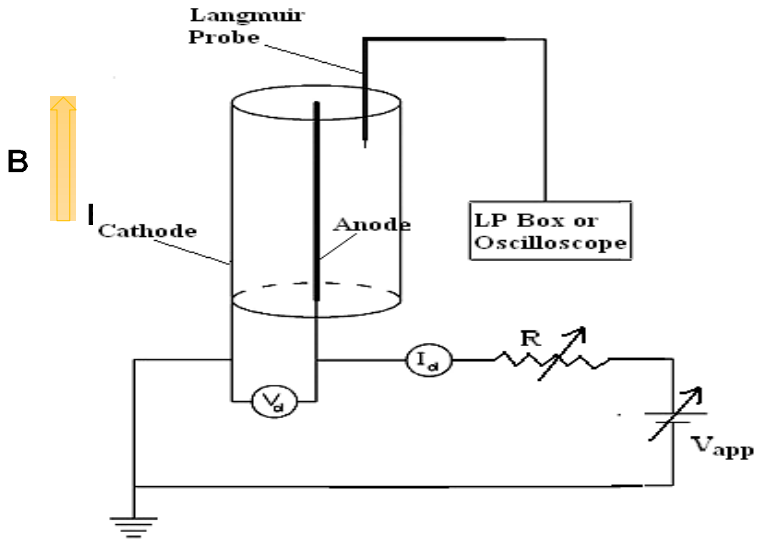

Fig.1: Schematic diagram of experimental set-up

For the measurement of plasma parameters, Langmuir probes (LP) are used extensively. A very important aspect of the LP measurements is the LP data analysis. It turns out that it is possible to deduce a great deal of information from LP data if these are analyzed systematically and carefully. The LP analysis for the present experiments was undertaken based on a procedure developed during earlier experiments [3, 4]. This procedure permits one to detect not only bulk plasma density, n_0 and bulk electron temperature T_e, but also warm / hot electron density, n_w (if present) and its temperature T_w, and plasma potential V_p. This information, when presented in the form of axial or radial profiles provides a powerful tool for gaining insight into the nature and workings of the discharge. It may be noted that in the experiments, the warm electrons are detected as a separate, thermalized population because they usually have sufficient time for thermalization when provided reasonable confinement. In order to characterize the plasma, a single LP will be fabricated and mounted in the system.

EXPERIMENTAL RESULTS AND THEIR SOCIAL / ACADEMIC IMPACT

On the basis of investigations carried out in this work, it has been identified that in short inter-electrode geometry the sustenance of the discharges are maintained by a hotter population of electrons, which aid in the ionization and excitation reactions that are not possible to occur through the bulk. The presence of this warm population has led to the sustenance of the discharge at lower currents (0.5 mA – few mA) and is indirectly responsible for the transition of the discharge through an NDR.

This need not occur for the central cathode configuration, as the surface area for secondary electrons generations (cathode surface) are significantly lower while the collecting area (anode) has increased manifold. This leads to development of the plasma profiles at lower currents itself with lower densities. This latter conjecture however needs to be investigated further for validation and has not been investigated in this work. This work is intended to be taken up in future.

However, in light of the oscillations, it seems that this layer can have the effect of a capacitor in series with the discharge, which blocks onset of low frequency oscillations at lower currents. It is only at higher currents that the discharge is able to sustain a relatively lower frequency oscillation, possibly an affect of short-circuiting of this layer, which could also explain the explosive nature of occurrence of the low frequency, large amplitude oscillations. Further experiments would be necessary to pinpoint the exact source. However, simulating the aging conditions being time-consuming, it has been decided to be taken up as an independent problem.

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INCORPORATING AGRICULTURAL RESIDUES INTO SUSTAINABLE AQUACULTURE FEED PRODUCTION: A STRATEGY TO ATTAIN SUSTAINABLE DEVELOPMENT GOALS IN INDIA

Tasmiya Khan, Maleeha Khan, Baby Tabassum* and Tayyaba Mujaddadi
Department of Zoology, Toxicology Lab, Govt. Raza P.G. College, Rampur (U.P.)
E-mail- dr.btabassum@gmail.com, khntasmiya17@gmail.com

ABSTRACT

The integration of agricultural residues into aquaculture feed production offers a sustainable and cost-effective alternative to conventional fish feed ingredients. India, with its vast agricultural output, generates significant byproducts such as rice bran, oilseed cakes, fruit peels, and vegetable residues, which possess essential nutrients beneficial for fish growth. Utilizing these materials in fish feed reduces dependence on fishmeal and soybean-based diets, making aquaculture more economically viable for small-scale farmers. This approach enhances resource efficiency, strengthens the agriculture-aquaculture nexus, and supports rural livelihoods by creating new opportunities for farmers and feed producers. Incorporating agricultural residues in aquafeed can improve fish nutrition by providing essential proteins, lipids, and micronutrients while maintaining ecological balance within farming systems. Moreover, advancements in feed processing, including fermentation and enzymatic treatments, enhance nutrient availability and digestibility, further optimizing their use in aquaculture. Despite challenges such as variability in nutrient composition and logistical constraints, strategic interventions, including policy support, stakeholder collaboration, and technological innovation, can facilitate the broader adoption of agricultural byproducts in fish feed. This chapter explores the potential of agricultural residues in sustainable aquafeed formulation, highlights their nutritional and economic benefits, and discusses practical strategies to optimize their integration into

aquaculture. By leveraging locally available resources, India's aquaculture sector can achieve greater self-sufficiency, reduce production costs, and contribute to long-term sustainability in fish farming practices.

Key words: Aquaculture; sustainability; Sustainable Development Goals; Waste; Environment

INTRODUCTION

The Sustainable Development Goals (SDGs) represent a global initiative aimed at eradicating poverty, safeguarding the environment, and ensuring prosperity across the globe by the year 2030. India has pledged to accomplish these goals as a signatory by implementing a number of programs that encourage sustainable practices in a variety of industries. Among these, aquaculture significantly contributes to improving food security and economic stability, especially in rural regions where communities frequently rely on fishing and farming for their livelihoods.

The fish feed industry plays a crucial role in aquaculture, representing a considerable share of production expenses. Historically, the formulation of fish feed has depended significantly on fishmeal and various marine resources, leading to concerns regarding sustainability. This chapter examines the novel strategy of leveraging agricultural waste as a valuable resource for the production of fish feed. Transforming agricultural by-products into high-quality feed presents an opportunity to address various sustainable development goals, all while promoting environmental sustainability and enhancing economic empowerment (Gatta, 2022).

The Role of Agricultural Waste in Fish Feed Production

Agricultural waste generated from fruit and vegetable processing includes peels, leaves, stems, and other by-products that are often discarded or underutilized. In India, where a significant number of fruits and vegetables are produced annually, this waste presents both an environmental challenge and an opportunity for innovation. Common examples include potato peels, banana peels, carrot tops, and leafy greens that are typically left over after harvesting or processing. Research indicates that

many types of agricultural waste contain essential nutrients beneficial for fish diets (FAO 2020). For instance, fruit peels are often rich in carbohydrates, fiber, vitamins, and minerals. Banana peels contain potassium and phosphorus, which are vital for fish health. Similarly, vegetable leaves are high in proteins and other micronutrients that can enhance the nutritional profile of fish feed. Utilizing these agricultural wastes not only addresses nutritional needs but also contributes to effective waste management solutions. Research in India has demonstrated the potential of converting rice bran into nutritionally balanced feed for tilapia aquaculture (Kumar and Singh 2021). These initiatives not only improve the nutritional quality of the feed but also reduce costs for farmers.

In many regions of India, agricultural residues are often burned in the fields after harvest, leading to air pollution and greenhouse gas emissions. By converting these wastes into fish feed, we can mitigate environmental impacts while providing an economically viable alternative for farmers (Kari et al., 2023).

Alignment with Sustainable Development Goals

Utilizing agricultural waste for fish feed production aligns closely with several SDGs. First and foremost, it contributes to SDG 2: Zero Hunger by improving food security through enhanced aquaculture productivity. As fish farming becomes more efficient with locally sourced feeds made from peels and leaves, it can help meet the growing demand for protein-rich foods in India. Moreover, this approach supports SDG 12: Responsible Consumption and Production by promoting the recycling of waste materials into valuable resources. By diverting agricultural waste from landfills or open burning—practices that contribute to environmental degradation—we can foster a circular economy that benefits both farmers and fishers. This not only enhances resource efficiency but also reduces the overall environmental footprint associated with traditional aquaculture practices (Troell et al., 2023).

Additionally, sustainable aquaculture practices contribute to SDG 14: Life Below Water by ensuring that fishing activities do not deplete marine resources. By reducing reliance on fishmeal derived from wild fisheries through the use of plant-based feeds

made from agricultural waste, we can help preserve aquatic ecosystems while promoting responsible fishing practices.

Challenges and Solutions

Despite the promising potential of using agricultural waste for fish feed production, several challenges remain. One significant issue is competition for these resources; agricultural wastes may also be sought after for livestock feed or other uses. Additionally, there may be logistical challenges related to collecting and processing these materials efficiently. To address these challenges, it is essential to foster collaboration among stakeholders—including farmers, researchers, policymakers, and NGOs—to create integrated systems that maximize resource use while minimizing competition. Community-based initiatives can play a vital role in raising awareness about the benefits of utilizing agricultural waste for fish feed production.

Policy support is also crucial; governments can incentivize sustainable practices through subsidies or grants aimed at developing infrastructure for processing agricultural wastes into animal feeds. Investing in research and development will further enhance our understanding of how best to utilize these resources sustainably.

Moreover, education plays a critical role in overcoming barriers to adoption. Training programs focused on sustainable aquaculture practices can equip local populations with the skills needed to participate effectively in this emerging sector. These programs can include workshops on processing techniques for fruit peels and vegetable leaves as well as best practices for integrating these feeds into existing aquaculture systems. As communities adopt these practices, they not only improve their livelihoods but also contribute positively to broader environmental goals aligned with India's commitment to the SDGs.

CONCLUSION

Integrating agricultural waste—specifically peels and leaves from fruits and vegetables—into sustainable fish feed production presents a viable pathway toward achieving multiple Sustainable Development Goals in India. By repurposing

underutilized resources into high-quality feeds, we can enhance food security while promoting responsible consumption and protecting aquatic ecosystems. The economic benefits for small-scale farmers are substantial; reducing feed costs while fostering local economies creates a win-win situation. Furthermore, addressing environmental challenges through sustainable practices enhances water quality and reduces pollution associated with traditional aquaculture methods.

As we move forward, it is essential to foster collaboration among all stakeholders involved in this process—farmers, researchers, policymakers—while investing in innovative solutions that harness the potential of agricultural waste effectively. Through concerted efforts toward sustainability in aquaculture practices, we can build resilient communities that thrive economically while contributing positively to our planet's health.

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TECHNOLOGICAL ADVANCEMENTS IN SCIENCE EDUCATION

Science education has undergone a significant transformation in recent years, largely due to the introduction of technological advancements. These innovations have revolutionized the way science is taught and learned, making it more **engaging, interactive, and accessible** for students of all ages. The integration of technology in science education has revolutionized the way students learn and interact with scientific concepts.

We are living in era of rapid technological advancements, and the field of science education is no exception. The way we learn and teach science is undergoing a significant transformation, driven by the integration of innovative technologies that are changing the landscape of education.

From **virtual labs to artificial intelligence** , from online resources to virtual reality, technology is revolutionizing the way we approach science education. These advancements are not only making science more accessible and engaging, but also providing new opportunities for students to explore complex concepts, conduct experiments, and develop critical thinking and problem solving skills.

The **history of science education is a long and complex one**, spanning thousands of years and involving the contributions of many cultures and civilizations.

In ancient ***Mesopotamia, Egypt and Greece***, science and mathematics were taught as part of a broader education in philosophy, literature, and politics. The ancient Greeks made significant contributions to the development of science, including the work of ***Aristotle, Euclid, and Archimedes.*** In ancient India, the ***Vedic period*** saw the development of a rich tradition of scientific and mathematical knowledge, including the work of the Indian mathematician and ***astronomer Aryabhata.***

During the Middle Ages, science education was largely limited to the study of ***Aristotelian philosophy*** and the works of

Galen and Ptolemy. The Islamic Golden Age saw a resurgence of interest in science and mathematics, with scholars such as ***Al-Khwarizmi*** and ***Ibn Sina*** making significant contributions to the development of Algebra, geometry, and medicine. In Europe, the establishment of universities such as the ***University of Bologna and the University of Oxford*** marked the beginning of a new era in science education.

The Renaissance saw a renewed interest in classical learning and the emergence of new scientific disciplines such as anatomy and astronomy. The work of scientists such as ***Galileo, Kepler, and Newton*** laid the foundations for the scientific revolution of the ***17th century***. The establishment of scientific societies such as the ***Royal Society and the Academie des Sciences*** marked the beginning of a new era in scientific collaboration and communication.

The ***19th and 20th centuries*** saw the development of new scientific disciplines such as biology, chemistry and physics, and the establishment of science education as a distinct field of study. The work of scientists such as ***Darwin, Einstein and Curie*** transformed our understanding of the natural world and the universe. The development of new technologies our understanding of the natural world and the universe. The development of new technologies such as the microscope, telescope, and computer enabled scientists to make new discoveries and explore new areas of research.(Osborne and Dillon; 2018)

The ***21st century*** has been a significant increase in the use of technology in science education, including the development of online resources, virtual labs, and simulation- based learning. The emphasis on ***STEM education*** (science, technology, engineering, and mathematics) has led to a renewed focus on the development of science education programs and policies. The work of scientists such as ***Stephen Hawking, Neil deGrasse Tyson, and Jane Goodall*** has helped to popularize science and make it more accessible to a broader audience.

Nowadays, Students can explore complex scientific concepts in a virtual environment, conducting experiments without the constraints of traditional labs. Virtual labs offer a safe space

for experimentation, especially for potentially hazardous activities. They also provide access to resources that may not be readily available in all schools.

- Students can access a wealth of scientific information, including videos, articles and interactive content, from anywhere with an internet connection. Educational apps and online platforms offer interactive exercises, quizzes, and games that make learning fun and reinforce scientific concepts.
- Digital textbooks incorporate multimedia elements such as videos, animations, and stimulations, making learning more dynamic and engaging. Gamified learning environments make science fun and encourage active participation. Students can earn points, badges, and rewards for completing tasks and mastering concepts.
- Video conferencing allows students to interact with scientists, researchers, and other experts from around the world, providing real- world context to their learning. Online quizzes and interactive assessments provide immediate feedback, allowing students to identify areas where they need to improve.(Bencze and Alsop; 2019)
- 3D printing technology allows students to create physical models of scientific concepts, such as molecular structures or anatomical models, helping to enhance their understanding and visualization of complex concepts.
- AI-powered tools, such as chatbots and virtual teaching assistants, can help personalize learning, provide real-time feedback, and support students in their scientific inquiries.(Wu and Chang; 2019)

Science education in Digital India is a rapidly evolving field, with the government launching several initiatives to promote digital learning and improve access to quality education. The **Ministry of Education** has introduced various schemes, such as

the **Rashtriya Ucchatar Shiksha Abhiyan and Unnat Bharat Abhiyan,** to enhance the quality of higher education and promote innovation in the field of science and technology (www.education.gov.in, 2025)

Digital education has emerged as a transformative force in India's educational landscape, with the availability of smartphones and internet connectivity making it possible for students to access a wide range of educational resources and learn from anywhere.

The **National Research Professorship** and **Pandit Madan Mohan Malviya National Mission on Teachers and Teaching** are some of the initiatives launched by the government to promote research and innovation in the field of science and technology. These initiatives aim to improve the quality of teaching and learning, and to promote the development of new technologies and innovative solutions.

These technological advancements have the potential to enhance student engagement and motivation, improve student understanding and retention of scientific concepts, facilitate collaboration and communication among students and teachers and increase access to scientific education for underprivileged students.

The use of technology in science education is not just about replacing traditional methods, but about enhancing the learning experience and providing students with the skills and knowledge they need to succeed in an increasingly complex and interconnected world.

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MY SOIL, MY PROGRESS: INDIA'S JOURNEY TOWARDS BIOPLASTICS AND SUSTAINABLE DEVELOPMENT

Maleeha Khan, Tasmiya Khan, Baby Tabassum, Umme Habiba Mujaddadi and Namra Nasir
Department of Zoology, Toxicology lab, Govt. Raza P.G. College, Rampur (U.P.)

ABSTRACT

India, a country deeply rooted in agriculture and rich in natural resources, is increasingly focusing on sustainable development to address environmental challenges. Among the innovations driving this shift is bioplastics, a promising alternative to traditional petroleum-based plastics. This chapter explores India's journey toward bioplastics, highlighting the country's vast agricultural resources, such as sugarcane, rice husks, and potato peels, that can be utilized for bioplastic production. It delves into the processes of creating various types of bioplastics, including starch-based plastics, PLA, PHA, and bio-PE, and examines the current initiatives and technological advancements that are fostering the growth of the bioplastics industry in India. While bioplastics present significant environmental benefits, challenges such as cost, infrastructure, and market acceptance remain. The chapter also aligns India's bioplastics development with global Sustainable Development Goals (SDGs), underlining the potential for bioplastics to contribute to responsible consumption, climate action, and economic growth. In conclusion, India's progress in bioplastics represents an opportunity to harmonize development with environmental sustainability, leveraging the country's agricultural heritage to foster a cleaner, greener future.

Keywords: Bioplastics, PLA, PHA, environmental sustainability, circular economy, renewable resources, plastic waste, SDGs.

INTRODUCTION

India, a land rich in biodiversity and natural resources, is facing an urgent need to balance development with sustainability. In a world increasingly aware of environmental degradation, the

concept of sustainable development has become the cornerstone of policy-making, industrial growth, and societal advancement. Among the critical innovations pushing this agenda forward are bioplastics—an emerging alternative to conventional plastics made from fossil fuels. India's journey towards bioplastics reflects both its rich agricultural heritage and its forward-thinking approach to addressing the climate crisis, economic inequality, and environmental pollution.

Bioplastics are materials derived from renewable sources like plant-based materials (corn, potatoes, sugarcane, etc.), compared to traditional plastics that are petrochemical-based (Sharma et al., 2020). This transition is not just a matter of technology, but a reflection of India's deep connection with its land, or "soil." It's about embracing the future while honouring the country's agricultural roots. In this chapter, we will explore how India is making strides in bioplastics production, how these innovations tie into the nation's broader development agenda, and what this means for the future of sustainable development.

The Plastic Problem in India

India, like many other developing nations, has been grappling with the widespread use of single-use plastics. According to various reports, India generates more than 3.5 million tons of plastic waste annually, contributing significantly to the global plastic pollution crisis. The issue is compounded by improper waste management, inadequate recycling infrastructure, and the rapid growth of urbanization. Plastics are often found littering streets, rivers, and beaches, harming wildlife and contributing to the clogging of waterways.

But the problem of plastic is not just about waste. Conventional plastic production contributes heavily to carbon emissions, with the fossil fuel industry at the core of this environmental toll. This calls for a shift towards alternatives that are not only biodegradable but also carbon-neutral or even carbon-negative. In this context, bioplastics represent a viable solution.

India's Unique Advantage: Agricultural Resources

India is one of the world's largest producers of agricultural

products, with a vast array of raw materials that can be repurposed for bioplastics production. The country's agricultural sector produces an enormous amount of waste annually—from sugarcane bagasse and rice husks to corn stalks and potato peels. By diverting these waste streams toward bioplastics production, India can reduce agricultural waste, provide new income sources for farmers, and lower the dependence on petroleum-based plastics.

For instance, India's sugarcane industry, which is already a significant contributor to the country's economy, provides an excellent raw material for bioethanol production. Bioethanol can be processed into biodegradable plastics, opening a new market for sugarcane byproducts. This provides a dual benefit: reducing plastic pollution and promoting sustainable agricultural practices.

Similarly, agricultural waste like rice husks, which are otherwise discarded, can be converted into bioplastics through advanced technologies. By incorporating agricultural waste into bioplastics, India can begin to close the loop between its agricultural practices and waste management, creating a more sustainable future.

India's Bioplastic Initiatives

Several organizations and government initiatives have already started promoting bioplastics production as part of India's national sustainability agenda. In 2020, the Indian government unveiled its ambitious "Plastic Waste Management Rules" to phase out single-use plastics by 2022, which was later extended. This law created a demand for alternatives to traditional plastics, providing a boost to the bioplastics industry.

Startups and research institutes have been at the forefront of exploring ways to scale bioplastics production. Companies such as "Bioline" and "Envigreen" have developed biodegradable alternatives made from plant-based materials like cassava starch, corn, and sugarcane. These companies are not just producing bioplastics for packaging but also for products like bags, cutlery, and food containers. With the Indian market's increasing preference for sustainable options, demand for these bioplastics is expected to rise steadily.

Moreover, India has also established collaborations with global leaders in bioplastics technology. For example, partnerships with European companies specializing in the production of biodegradable plastics have opened up avenues for knowledge transfer, advanced production techniques, and greater access to international markets. This collaborative approach allows India to leapfrog into the bioplastics industry, taking advantage of both domestic resources and global expertise (Shevchenko et al., 2022).

How Bioplastics are Made

Bioplastics can be made using various processes depending on the raw materials involved. The basic types of bioplastics include starch-based plastics, polylactic acid (PLA) plastics, and bio-polyethylene (bio-PE). Each of these types is derived from renewable biomass resources such as crops, algae, or waste materials, and they vary in their production processes.

Starch-based Plastics:

Starch-based bioplastics are primarily made from crops such as corn, potatoes, or tapioca. The process starts with the extraction of starch from the raw plant material. This starch is then mixed with water and other biodegradable compounds like glycerol to form a gel-like substance. The mixture is heated and shaped into plastic materials. Starch-based plastics are primarily used for packaging, disposable cutlery, and films. In India, starch from crops like potatoes and corn is abundant, making it a sustainable option for large-scale production (Siqueira et al., **2020).**

Polylactic Acid (PLA) Plastics:

PLA is one of the most commonly used types of bioplastics. It is made from fermented plant starch (usually derived from corn or sugarcane). The fermentation process produces lactic acid, which is then polymerized into long chains to form PLA. PLA is compostable and is used for products such as food packaging, cups, and medical applications. In India, large-scale sugarcane production could play a central role in PLA production, tapping into the existing infrastructure for ethanol production and refining it into higher-value bioplastic products (Taib et al., 2022).

Polyhydroxyalkanoates (PHA):

PHA is a family of biodegradable plastics produced by bacteria through fermentation processes. These bacteria consume sugars or lipids and convert them into plastic materials. PHA can be produced from waste materials like food scraps or agricultural residues. As PHA can be tailored to degrade in various environments, it holds great potential for creating plastics that do not contribute to environmental pollution. India's agricultural waste streams, such as rice husks and wheat straw, can provide an ideal feedstock for the production of PHA (Sharma et al., 2020).

Bio-Polyethylene (Bio-PE):

Bio-PE is a renewable alternative to conventional polyethylene (PE), the most common plastic used in bottles, containers, and packaging materials. Bio-PE is made from ethanol derived from sugarcane, and while it shares the same chemical structure as conventional PE, it is produced from renewable sources, making it more sustainable. India's large sugarcane industry can be leveraged to produce bio-PE, reducing its reliance on imported petroleum-derived polyethylene.

The production of bioplastics is not just about raw materials—it also involves technological advancements to make the process more efficient and scalable. Research institutions and industry players in India are exploring ways to enhance the productivity of bioplastic production, including optimizing fermentation processes and discovering new, more sustainable feedstocks.

The Intersection of Bioplastics and Sustainable Development Goals

Bioplastics production in India is not just about creating an alternative to petroleum-based plastics—it's about making progress toward the United Nations' Sustainable Development Goals (SDGs). India's commitment to reducing its carbon footprint aligns with the global push for a circular economy, where waste is minimized, resources are reused, and the environmental impact is reduced (Shevchenko et al., 2022).

Bioplastics directly contribute to several SDGs:

I. **SDG 12 – Responsible Consumption and Production**: By shifting to bioplastics, India can reduce the consumption of fossil fuels and decrease plastic waste, promoting responsible production processes that are sustainable in the long run.

II. **SDG 13 – Climate Action**: With bioplastics, India can reduce the carbon emissions associated with plastic production and waste. The production of bioplastics from agricultural waste helps sequester carbon, thus aiding in climate change mitigation efforts.

III. **SDG 2 – Zero Hunger**: By using agricultural waste to create bioplastics, farmers can find new markets for their byproducts, increasing their income and contributing to food security.

IV. **SDG 8 – Decent Work and Economic Growth**: The bioplastics sector creates new employment opportunities in research, production, and waste management. By leveraging its agricultural strengths, India can create new economic opportunities that drive growth.

V. **SDG 6 – Clean Water and Sanitation**: Reducing plastic waste from rivers and oceans by shifting to biodegradable plastics helps protect water sources, contributing to cleaner water systems and reducing pollution.

Challenges in Scaling Bioplastics

While the potential for bioplastics in India is immense, several challenges remain. The cost of bioplastics production, compared to conventional plastics, can still be prohibitive. Research and development into more efficient methods of bioplastic production must be accelerated; while scaling up the industry will require substantial investment in infrastructure, technology, and training.

Another hurdle is consumer awareness and market

acceptance. Many consumers are still unaware of the environmental impact of single-use plastics and the availability of sustainable alternatives. Additionally, the infrastructure required for the collection, recycling, and composting of bioplastics is not yet widespread. India's urban areas may have access to basic waste management systems, but rural regions still lack the necessary facilities to dispose of and recycle bioplastics effectively.

The Indian government, however, can play a pivotal role in addressing these issues by incentivizing bioplastics production, funding research, and creating a regulatory framework that encourages both domestic and international businesses to invest in bioplastics. A holistic approach, integrating education, infrastructure, and policies, will be key to realizing the full potential of bioplastics in India **(Goldberg et al., 2025).**

The Road Ahead: Empowering India's Future

India's potential for bioplastics is vast, and its progress in adopting sustainable alternatives is encouraging. However, achieving large-scale transformation requires commitment from all sectors: government, industry, civil society, and the agricultural community. India must continue to invest in bioplastics technology, raise awareness about sustainable alternatives, and develop policies that encourage a circular economy.

By leveraging the resources found in its soil, India has the opportunity to not only address one of the most pressing environmental issues of our time but also build a more equitable and sustainable future. In doing so, it can prove that development does not need to come at the expense of the planet.

CONCLUSION

"My Soil, My Progress" is not just a slogan; it encapsulates the very spirit of India's journey toward sustainable development through bioplastics. The shift from conventional plastics to bioplastics represents more than an environmental solution—it's a powerful message about rethinking development, sustainability, and progress in a way that honours both the Earth and its people. Through innovation, collaboration, and a strong connection to the land, India is paving the way for a more sustainable, bioplastic-

powered future. The soil that nurtures its agriculture holds the key to a greener, cleaner world—a world where the progress of today does not come at the expense of tomorrow.

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THE ROLE OF WOMEN IN THE FREEDOM STRUGGLE

Nisha Bi, Karuna Maurya, Reena Kumari and Nidhi Gupta*
Parasitic Entomology Research Lab, Department of Zoology.
Govt. Raza P. G. College, Rampur (U.P.)

ABSTRACT

The history of Indian liberation fight would be incomplete without highlighting the efforts of women. The sacrifices made by Indian women will take center stage. To gain our independence, they endured several forms of torture, abuse, and adversity while fighting with unwavering bravery and passion. Women took the lead in the fight when the majority of the male freedom fighters were imprisoned. There is a lengthy list of outstanding women whose names have been recorded in history due to their unwavering commitment to serving India. Women started taking part in the Indian independence movement as early as 1817. In guerrilla warfare, Bhima Bai Holkar defeated the British colonel "Malcolm" after a valiant battle. In the 19th century, thirty years prior to the "First War of Independence 1857," a number of women, notably Rani Channamma of Kittur and Rani Begam Hazrat Mahal of Avadh, fought against the British East India Company. Even the commanders of the Revolt were impressed by the admirable role that women played in the 1857 struggle of freedom. The Rani of Ramgarh, Chauban Rani, Tapasvini Maharani, Baiza Bai, Rani Tace Bai, and Rani Jindan Kaur bravely led their armies into battle. The bravery and exceptional leadership of Rani Lakshmi Bai Jhansi set a remarkable example of true patriotism. Indian women from all walks of life, castes, faiths, and groups, as well as those from rural regions, came from liberal and educated homes and joined the national movement. The names of Sarojini Naidu, Kasturba Gandi, Vijayalakshmi Pundit, and Annie Besant from the 20th century are still known today for their exceptional contributions to politics and the battlefield.

Keywords: *India, freedom, struggle, women and revolt*

INTRODUCTION

Without the support of women's movements and liberation

fighters, the achievement of India's independence would have remained a dream. These women's organizations and individual women came forward, took the initiative, and played a crucial role when the great freedom warrior was imprisoned. The untold history of India suggests that the role that great women played in the path of the Indian liberation struggle is not too much mentioned in our history books. Customs, caste structures, gender inequality, and traditional human behavior all sustain India as a nation pre-independence times, women were considered second-class citizens and confined behind the four walls of their houses, oblivious to the outside world. Females were not educated, and no skill development training was available to them. Women in India had access to education during the Vedic era, but as time went on, its significance waned. To improve women's standing and end the sati system, Indian social reformers like Raja Ram Mohan Roy, Jyotiba Phule, and Ishwar Chandra Vidya Sagar surmounted several challenges. Rani Lakshmi Bhai was one of the well-known ladies who battled for India's freedom. We can go all the way back to 1817, when the first female socialists were Madam Bhaikaji Cama, who battled for her motherland's freedom during the 1857 Uprising, and Bhima Bai Holkar, who battled the British for her nation's freedom. In the struggle against imperialism, women have been instrumental. Women of India suffered from extreme torture, hardship, and exploitation in the name of granting their nation's citizens independence. Women's extraordinary efforts throughout the freedom movement are greatly appreciated. The role was played during the First War for Independence (1857–1858), the Quit India Movement (1942), the Civil Disobedience and the Dandi March (1930), the Non-Cooperation Movement (1920), and the Jalianwalabagh Massacre (1919).Women from diverse backgrounds, including liberal and educated families, as well as those from different castes, religious groups, and rural lifestyles, came together to fight for their motherland's independence. Only a small number of the more than 100 female freedom warriors who participated and gave their lives in defense of their country are mentioned in the literature.

OBJECTIVES OF THE STUDY:

The study involved the following objectives.

1. To research the Indian freedom movement as a whole.
2. To study when the men freedom fighter is in prison the women took the charge of freedom struggle.
3. To explore the role played by women freedom fighter in freedom movement of India.
4. To critically evaluate the contribution of women in Indian freedom movement and politics.

Valuable events in India's freedom struggle

1. The first war of Independence (1857-58)
2. Partition of Bengal,Swadeshi Movement (1905)
3. Jallianwala Bagh Massacre (1919)
4. Non-cooperation movement (1920)
5. The Indian National Congress's announcement of Poorna Swaraj and the 1929 Meerut plot
6. Civil disobedience:The Dandi March (1930)
7. The Quit India Movement (1942)

Women in the Mainstream Independence Movements

Women were key players in furthering the cause of independence as India's nationalist movement gained momentum in the late 19th and early 20th centuries. Their active involvement in several nationalist groups and campaigns was crucial in determining how the conflict developed.

Role of Women in First War of Independence

Women's involvement in India's independence movement dates back to 1817. Bhimbai Holkar bravely fought against British colonel Malcolm and defeated him in guerila warfare; many women, including Rani Channamma of Kittur and Rani Begam Hazarat Mahal of Avadh, fought against the British East India Company in the 19th century. The role that women played in the 1857 war of independence was commendable and attracted the support of the revolt's leaders. Rani of Ramagarh, Rani Zindankaur,

Rani Tacebai, Baizabai, Chauhan Rani, and Tapasvini Maharani boldly led their troops into battle; and Rani Laxmibai of Jnansi, whose bravery and excellent leadership set an exceptional example of true patriotism.

Impact

- Women's participation in the freedom struggle empowered women and opened doors for gender equality.
- It led to social reforms, such as the abolition of purdah and child marriage in some regions.

CONCLUSION

The history of the Indian Freedom Struggle would be incomplete if women's accomplishments were not recognized. The sacrifice made by Indian women will come first. They battled valiantly and gallantly to protect our independence in the face of countless abuses, cruel treatment, and difficulties. When most of the male freedom fighters were put in jail, the women took over the battle. Because of their unshakable dedication to helping India, the names of many amazing women have been documented in history. Among the more than 100 women who took part in the fight for an independent India are notable figures such as Matati Choudhary, Subhadra Joshi, Basanti Sen, Ahslata Sen, Kanakhalat Barua, Tara Rani Srivastava, Kamaladevi Chattipadhyay, Molmati, Durgabai Deshmuka, and Rukmini Lakshmipathi.

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THE ROLE OF WOMEN IN THE FREEDOM STRUGGLE

Jasveer Kaur[1] and Dr. Bijender Singh[2]
[1]Research Scholar (Education), MJP Rohilkhand University, Bareilly (UP), [2]Assistant Professor, Department of Education, Govt. Raza Post Graduate College, Rampur (UP)

INTRODUCTION

India is the land of great warrior and Saint. these distinguished scholars and freedom fighters contributed in the movement of freedom struggle of India. As well as many women given their contributions. Many women scholars such as Apala, Ghosha, Lopamudra are born in this land and enlightened the land of India. In Vedic period the place of women were in peak. But the declining of Maurya and Gupta period seen the downfall of women's image. They are prohibited in public places and also ban in public speeches. The parda is mandatory for all women of elite and non-elite society. The arrival of British power in India had risen their status and symbolising their importance in Indian struggle. women played a key role in India's fight for independence from British rule. They participated in public demonstrations, organised protests and supported political leaders. Their actions helped to shape the nations journey towards independence.

The significance of women's contribution was not only instrumental in shaping the trajectory of the independence movement but also in redefining gender roles and societal norms. From diverse regions, backgrounds, and walks of life, these women united under the common banner of freedom, leaving an indelible mark on India's history. The history of Indian struggle was not finalising without remembering & mentioning the sacrifice, which given by women. Their struggle for India's freedom was unforgettable.

CHARACTRISTICS OF WOMEN'S PARTICIPATION IN FREEDOM STRUGGLE –

The participation of women in India's freedom struggle was a valuable and effective aspect of the movement. women from all over the India, belonging from different geographical region,

religions and social backgrounds, readily participated to the battle for independence from British colonial rule. Women's participation in the freedom struggle had various characteristics. These were –

Gandhiji's support for women freedom fighters – Gandhi played a crucial role in assuring and encouraging women's participation and gained the support of women's guardians. Non-violence was seen as a factor that facilitated women's equal participation, as they possessed qualities of tolerance, courage and capacity for suffering.

The great revolt of 1857 – women played a significant role in the 1857 revolt against the British East India company, fighting alongside men and taking on leadership roles.

1. **Rani Laxmibai of Jhansi – Rani** Laxmibai who also known by many names -mannu &manikarnika Tambe, was born on 19 November 1828-18 June 1858. She was also renowned as Jhansi ki rani, was the Maharani consort of the princely state of Jhansi in the Maharatha Empire from 1843 to 1853 by marriage to Maharaja Gangadhar Rao Newalkar. She was one of the salient figures in the Indian sepoy mutiny of 1857. She recognized as a national legendary figure, who successfully defeated Britishers in battles.

2. **Mandar –** mandar, a young Muslim woman, was rani laxmibai's personal bodyguard and sacrificed her life with the rani on June 18, 1858 at kotha-ki-Sarai battle in Gwalior.

3. **Jhalkaribai –** Jhalkaribai was rani Laxmibai's body double, and the head of Durga Dal – the women's bridge of Jhansi's armies include ladies such as-Sundari bai, Mundari bai and Moti bai. The name of group was Durga Dal.

4. **Begam Hazrat Mahal of Awadh –** Begam Hazrat Mahal of Awadh gave the longest resistance to the British. The main cause of fight between Awadh and British army was taken over the emperor of Awadh forcefully.

5. **Uda devi of Lucknow –** Uda devi of Lucknow was a sharpshooter and sniper who killed 32 British soldiers individually. She was from downtrodden Pasi caste, which observe an untouchable.

6. **Aziz-un-Nisa or Azizan Bai of Kanpur –** Aziz-un-Nisa or Azizan Bai of Kanpur was a courtesan in Kanpur, and she made a gun battery her headquarters to collect and distribute arms and ammunition to the soldiers. There is also a myth about her, that she wore the male cloth in the battle ground.

7. **Rani Avantibai Lodhi of Raigarh –** Rani Avantibai Lodhi raised an army of 4,000 to fight the British when they illegally annexed Raigarh. She fought in the battlefield on horseback and when she released her defeat was certain, she killed herself with her own sword.

8. **Rani Jindan Kaur of Punjab –** Rani Jindan Kaur of Punjab was the youngest queen of first Maharaja of Sikh emperor Ranjit Singh, she was beautiful and energetic queen of Punjab, but the fear between British army was her fearless fight with them.

9. **Thana Bhawan –** In a small town, Thana Bhawan, situated in Muzaffer Nagar district in Uttar Pradesh, 13 valiant women coming from different religions and castes were hanged together or brunt alive for taking part into 1857 revolt against British rule- Asghari begam, Asha Devi, Bhagwati Devi Tyagi, Habiba, Mann Kaur, Umda, Raj Kaur, Inder Kaur, Bakhtawar, Jamila Khan, Rahimi, Bhagwani, Shobha Devi, and Beebee.

10. **1 Asghari Begum –** Asgari begum was 45 years old, belonged to a wealthy family and was burnt alive **for** arranging the armed force against the Britishers in the area in 1858.

10.2 Asha Devi – Asha Devi, 28 years old, was a member of a Hindu Gujjar family and was hanged in 1858.

10.3 Bhagwati devi – Bhagwati Devi, 23 years old, born into a Tyagi family of farmers who took rebellion against Britishers in many battles, was hanged in 1858.

10.4 Habiba – Habiba, 24 years old, coming from a Muslim Gujjar family, she fearlessly took part in many battles to free her motherland from British power. She arranged a great

army and call up her neighbourhood for the liberation struggle. She was arrested while resisting a British attack and was executed in gallows in 1858.

10.5 Maan Kaur – Maan Kaur, a 25 years old woman coming from the family of shepherds was a courageous Sikh lady, who fought with Britishers fearlessly and hanged in 1858.

10.6 Umda – Umda, 26 years old was a lady who come from the Jat Muslim family, who dedicated her life to save her land from British invasion. She fought many battles against the Britishers.

10.7 Raj Kaur – Raj Kaur, a lady from Rajput linage combat against Britishers and at the age of 24, she offering her life to save her motherland from British power.

10.8 Jamila – Jamila, a Pathani women involved into the freedom struggle and took up weapons against Britishers and was martyred in 1858.

10.9 Rahimi - Rahimi, 28 years old, Muslim Rajput lady hanged in 1858.

10.10 Bhagwani – Bhagwani, belonging to a Brahmin family was hanged just at the age of 26 years in 1858.

10.11 Beebee – Beebee, was a young Muslim woman, who was also hanged in 1858.

10.12 Mahabiri Devi of Mundbhar – Mahabiri Devi a downtrodden lady from the village of Mundbhar in the district of Muzaffarnagar was formed a group of 22 women, who together attacked and killed many British soldiers in 1857. The women were all caught and killed by British army.

10.13 Rani Draupadibai of Dhar – Rani Draupadibai was the architect of the revolution of Dhar region. British troops besieged the fort of Dhar on 22 October 1857. The struggle between Rani and British army were continued till October 1857. British soldiers entered the fort due to crack in the wall of the fort.

10.14 Rani Ishwar Kumari Devi of Tulsipur – Rani Ishwar

Kumari Devi of Tulsipur was a consort of Raja Drig Narayan Singh who was captured by Britishers. Rani valiantly fought against the Britishers to released her husband and also free her land from foreigner's invasion. She considered the heroine of 1857 revolt. She made a large troop to fight with them. Britishers.

Salt satyagraha & Civil disobedience movement

The salt satyagraha, also known as the salt march, Dandi march or satyagraha was an act of non- violent civil disobedience in colonial India, led by Mahatma Gandhi. Many Indian & foreigner women participated in this historical march from Sabarmati ashram to Dandi. The pioneer women leader in this march was Sarojini Naidu, Kamala Devi, Hansa Mehta, Durgabai Deshmukh, Avantikbai Deshmukh and so on. Women came from their homes and participated in large scale. they manufactured salt, picketed foreign cloth and liquor shops.

1) **Raj Kumari Amrit Kaur -** Raj Kumari Amrit Kaur was a first woman health minister in post – independent India. In 1930 she actively participated in salt satyagraha and the quite India movement. She was the close follower of Gandhiji from 1919 to till his death.

2) **Kamaladevi Chattopadhyay-** Kamla Chattopadhyay was a leading woman in salt march. She galvanized all India women's conference into a dynamic movement and captured the imagination of all India into one thread. After the partition of India, she was active in women relief camp.

3) **Durgabai Deshmukh -** Durgabai Deshmukh was an Indian freedom fighter, lawyer, social worker and politician. She was a prominent leader in salt satyagraha, she enforces women satyagrahis into the civil disobedience. This led to British Raj authorities imprisoning her three times between 1930 to 1933.

4) **Sarojini Naidu –** the Indian nightingale not only recognized by her poems, but also a great women leader who inspire many women to participate in Indian freedom movement. She promoted non-violence in all over the world. she was the first lady governor of India from united province. To remember

her contribution into Indian history every year on 13 February Indian government celebrate this day as "national women day".

5) **Rani Gaidineliu -** Rani Gaidineliu was a prominent Naga nationalist woman leader from Manipur who took over the movement of Naga Nationalists against the British. Her agitation for Naga tribe was active during the civil disobedience movement to oust the foreigners from Manipur. She was captured in 1932 and still in jail 1947. She released from jail after the Indian independence. Jawahar Lal Nehru given her tittle "Rani of Nagas".

Participation of women in Revolutionary Activity - Indian

women also played a crucial role into Indian freedom. They helped revolutionaries in their goal, such as Bhabhi Durga das assisted, Bhagat Singh escape from Lahore after the assassinated British officer John P. Saunders 1928. As well as many Indian and foreigner women consciously participated in revolutionary activity. they are following –

1) **Kalpna Dutta –** Kalpana Dutta was a prominent figure who was inspired and influenced by the revolutionary idea of Surya Sen. She joined the Chittagong armoury raids. Later she joined the communist party of India.

2) **Durgawati Devi-** Durgawati Devi as popular by "Durga Bhabhi" was an active member of the "Nau jawan Bharat Sabha", and she assisted in the escape of Bhagat Singh from Lahore after the Saunders killing (1928).

3) **Pritilatta Waddedar –** Pritilatta Waddedar, was influenced by the Kalpna Dutta and Nalini Pal. She worked under the leadership of Surya Sen. Pritilata and few revolutionary planned to attack Chittagong. Thereafter, a fierce gun battle ensued. She was shot in her leg and upon realising her imminent arrest, she sacrificed her life for the motherland by consuming a cyanide capsule from her pocket.

4) **Shanti Ghose & Suniti Chaudhary –** Shanti Ghose and Suniti Chaudhary both were young revolutionaries, who assassinated a British District Magistrate of Comilla, C.G.B. Stevens.

5) **Bina Das –** Bina das was a young revolutionary of Bengal, who shot on Bengal governor Sir Stanely Jackson during the convocation of Calcutta university.

6) **Kalyani Das –** Kalyani Das was the elder sister of Bina Das, who formed the Chatri Sangh with the helped of Surma Mitra, Kamla DasGupta in September 1928.

7) **Madam Bikaji Kama –** Madam Bikaji Kama popularly known as the "mother of Indian revolutionary". Madam Bikaji Kama became first person to hoist the Indian flag in foreign land on 22 August 1907.

Participation of women in Quit India movement

Quit India movement is the indispensable in the history of Indian freedom. As we know that after world war 2nd, all the colonized country demanded their self-identity. To concern this on mind Mahatma Gandhi gave the slogan to the Nation **"DO OR DIE".** Gandhiji also felt the importance of women in this fight of freedom. Many Indian as well as many foreigners (which support Gandhian view) came together to free India from British rule.

1) **Usha Mehta –** Usha Mehta was an active revolutionary in the time of Quite India movement. She secretly broadcast the whole programme of National Congress in 14 August 1942.

2) **Sucheta Kriplani –** Sucheta Kriplani actively supported the all revolutionary like her contemporize Usha Mehta, and Aruna Asaf Ali. She was elected for the constitutional assembly and also the first woman chief minister of Uttar Pradesh.

3) **Aruna Asaf Ali –** Aruna Asaf Ali played a essential role as she unfurled the National flag at the Gowalia Tank Maidan in Bombay. She also edited a monthly magazine "**Inqilab".** She awarded the India's highest civilian award, Bharat Ratan.

4) **Matangini Hazara -** Matanagini Hazara as popularly known as **"Budi Gandhi". She** participated in the quite India movement from west Bengal. She taken national flag with her and march towards tamluk police station. The police shot her three times, but in her last breath, she kept chanting the "Vande mataram".

5) **Kasturba Gandhi –** Kasturba Gandhi the wife of Mahatma Gandhi was also actively supported the all-Indian freedom movement, such as she assisted Champaran revolt1917, and taught women about hygienity, discipline, health, reading and writing. Gandhiji call **"BA"** to Kasturba Gandhi as she devoted her services to Sabarmati ashram.

6) **Padmaja Naidu –** Padmaja Naidu, the daughter of Sarojni Naidu was as actively supported the Indian freedom movement as her mother. She elected the 4th governor of west Bengal from 1956 to 1967.

7) **Kanaklata Baru-** Kanaklata Baru as popularly known the **"Rani Laxmibai of East",** as well as she also calls the **"Beerbala".** She actively supported the quiet India movement and shot by British armed police Infront of Gohpur police station.

Participation of Froeign women in Indian national movement

20th century saw the drastic change into the history of Indian struggle as Mahatma Gandhi came India 1915 and risen the nationalism into Indians. Many foreigners also felt the need of education, which awoke the soul of Indians. In 1916 an Irish lady Mrs. Annie Besant came to India and open the Theosophical society to enhance the participation of women.

1) **Annie Besant –** Annie Besant was a Irish lady who served in National movement of India. She established the Indian home rule League with the help of Lokmanya Tilak in madras, 1916. She also established the theosophical society of India. She edited two magazine "New India" and "Commonwealth". She was great philosopher who enlightened the path for Indians.

2) **Mira Alphonse-** Mira Alphonse, known as "MOTHER" was born in Paris 1878. She came India in 1914 and deeply influenced by the teaching of Shri Arbindo. She also inspires the Annie Besant and Nellie Sengupta.

3) **Meera Behn & Sarla Behn –** Meera Behn & Sarla Behn two disciple of Mahatma Gandhi was helped him in round table and did many reforms in hill area people in their living. Such

as Sarla Bahn (catherine Mary Heilman) established the Kasuli Ashram in Kumaon hills of Almora to educate people for eco system of Himalaya. They both popularly known as the two English daughter of Gandhi.

4) **Sister Nivedita –** Sister Nivedita (Margaret Elizabeth) was an Irish social activist, teacher, author, and disciple of Swami Vivekanand. She was deeply influenced by the teaching of yoga darshan. She assisted Indian women empowerment and also promoted swadeshi practices.

CONCLUSION

India is the land of great warrior, as they protect the land from the outsider invasion from time to time. the history of Indian land had changed, when women also protected the motherland from foreigners. First example was setup by Rani Laxmibai and many more in the 1857 revolt. After the unsuccessful attempt of sepoy mutiny Indian leaders felt the absent of Indian women in freedom struggle. they recognised the importance of their role in freedom struggle and our national father Mahatma Gandhi identify them into non -cooperation movement 1922. Many Indian women such as Sarla devi, Muthu Laxmi Reddy, Susheela Nair, Lado rani zutushi and her daughter gave their support to Indian struggle. In Gandhian phase of Indian struggle 1) salt satyagraha and civil disobedience movement many foreigner women also contributed such as Annie Besant established theosophical society 1916 & Indian home rule 1917, Sarla Bahn's kasuli ashram and many more. They joined shoulder with men and equally given their services to motherland. But still many Indian women were not recognized. we should include their sacrifices into our school syllabus, by this new generation would recognise and understand their love for motherland.

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A SELF-RELIANT INDIA: VISION FOR THE FUTURE

Monika Khanna and Jyoti
Assistant Professor, Department of Economics, Govt. Raza P.G. Degree College, Rampur (U.P.)
E-Mail:monika.khanna37@gmail.com, jyotikatheria05@gmail.com

ABSTRACT

This chapter explores the concept of a self-reliant India, known as 'Atmanirbhar Bharat,' representing a transformative journey toward sustainable growth, inclusivity, and global leadership. The narrative delves into India's historical context of self-reliance, the five key pillars supporting this vision, and the critical sectors that demand focused development. It incorporates current data on economic growth, sectoral achievements, and challenges. While outlining issues such as infrastructure gaps, workforce skilling, and environmental sustainability, it emphasizes the role of citizens and global partnerships. The chapter concludes by portraying a future where India stands as a beacon of resilience, empowerment, and sustainable growth.

Keywords: Self-Reliant India, Atmanirbhar Bharat, Sustainable Growth, Global Leadership, Swadeshi, Economic Resilience, Indigenous Innovation, Infrastructure Development, Renewable Energy, Skill Development, Environmental Sustainability.

INTRODUCTION

India, a land of diverse cultures, rich heritage, and remarkable potential, has embarked on a transformative journey toward self-reliance through the vision of 'Atmanirbhar Bharat' or Self-Reliant India. This initiative, championed by the government and embraced by citizens, is not merely a response to contemporary challenges but a paradigm shift aimed at sustainable growth, inclusivity, and global leadership. The concept of Atmanirbhar Bharat is deeply rooted in India's historical aspirations for self-sufficiency, yet it evolves with modern dynamics, blending tradition with innovation.

Historical Context

India's aspiration for self-reliance is deeply rooted in its historical struggle for freedom. During the pre-independence era, leaders like Mahatma Gandhi championed the cause of 'Swadeshi,' emphasizing the production and consumption of indigenous goods as a means of economic empowerment and resistance against colonial exploitation. Gandhi's call for self-reliance resonated with millions, inspiring a movement focused on economic independence. The Swadeshi movement not only symbolized resistance against foreign dominance but also laid the ideological foundation for a self-sufficient and empowered India.

In the years following independence, India's economic policies reflected this aspiration for self-reliance. The newly sovereign nation prioritized import substitution and industrialization to reduce dependency on foreign goods and build a robust domestic economy. Public sector undertakings (PSUs) became the cornerstone of this strategy, with significant investments in heavy industries, energy, and infrastructure. These efforts were further complemented by the Green Revolution, which transformed India from a food-deficient country to a self-sufficient agricultural powerhouse.

However, the economic liberalization of the 1990s marked a turning point. Faced with a balance-of-payments crisis, India adopted policies that opened its economy to global markets. This shift toward globalization spurred remarkable economic growth, fostering innovation and entrepreneurship. Yet, it also exposed vulnerabilities in critical sectors heavily reliant on imports, such as electronics, pharmaceuticals, and defense equipment. These vulnerabilities were starkly highlighted during the COVID-19 pandemic, which disrupted global supply chains and underscored the importance of self-reliance in ensuring national resilience.

Economy

India's economic self-reliance is anchored on policies and programs designed to strengthen domestic industries and reduce dependency on imports. A cornerstone of this effort is the Production-Linked Incentive (PLI) schemes, which have already attracted investments worth ₹ 1.46 lakh crore. These schemes have

resulted in ₹ 12.50 lakh crore in production and ₹ 4 lakh crore in exports, showcasing their effectiveness in boosting sectors such as electronics, pharmaceuticals, and textiles. One of the primary focuses of Atmanirbhar Bharat is the empowerment of micro, small, and medium enterprises (MSMEs). Contributing significantly to India's GDP and employment, MSMEs play a vital role in building economic resilience. The government has introduced measures such as collateral-free loans, credit guarantees, and simplified tax regimes to support these enterprises. Additionally, platforms like the Unified Payments Interface (UPI) have revolutionized financial inclusion, enabling small businesses and individuals to access banking and credit facilities with ease.

Efforts to boost agricultural productivity and farmer incomes are also integral to economic self-reliance. Programs such as the Pradhan Mantri Fasal Bima Yojana and Kisan Credit Card Scheme ensure financial security for farmers, while investments in agri-tech and supply chain infrastructure reduce post-harvest losses. By strengthening rural economies, India aims to create a more inclusive and robust economic framework.

Infrastructure

Infrastructure development serves as the backbone of Atmanirbhar Bharat, driving connectivity, productivity, and sustainability. The National Infrastructure Pipeline (NIP) outlines an ambitious investment plan of ₹ 111 lakh crore by 2025, focusing on critical sectors such as transportation, energy, and urban infrastructure.

Digital infrastructure is another critical area of focus. The expansion of broadband connectivity to rural areas through the BharatNet program bridges the digital divide, enabling inclusive growth. By providing access to digital services such as e-governance, telemedicine, and online education, the initiative empowers citizens and enhances their quality of life. Public-private partnerships (PPPs) play a vital role in accelerating infrastructure development, ensuring efficient resource utilization and fostering innovation.

Technology and Innovation

Technological advancement is a cornerstone of the

Atmanirbhar Bharat vision, enabling India to compete globally and address domestic challenges effectively. The country's achievements in indigenous vaccine development, such as Covaxin, and ambitious space programs like Chandrayaan-3 and Gaganyaan exemplify its growing capabilities in science and technology.

The digital ecosystem, powered by platforms like Aadhaar and UPI, has revolutionized governance and financial inclusion. Aadhaar's biometric-based identification system has streamlined access to government services, while UPI's real-time payment system has transformed the way transactions are conducted, driving transparency and efficiency.

Demography

India's demographic dividend, characterized by a young and dynamic population, is a critical asset for achieving self-reliance. However, challenges such as unemployment among educated youth and regional disparities in education remain significant obstacles.

Skill development programs like Skill India and Pradhan Mantri Kaushal Vikas Yojana (PMKVY) aim to bridge the skill gap by providing vocational training and industry-relevant education. These initiatives equip the workforce with the necessary skills to meet the demands of a rapidly evolving economy, ensuring that India's demographic advantage is fully utilized.

Key Sectors for Self-Reliance

Achieving self-reliance requires focused development in critical sectors such as **agriculture, manufacturing, energy, healthcare, and defense.** These sectors form the backbone of India's economy and national security.

Current Data on Key Indicators:

Sector	Current Status	Targets by 2030
GDP Growth	6.4% (2024-25 projection)	Achieve sustained growth above 7%
Renewable Energy	175 GW installed (2023)	500 GW capacity
Manufacturing	Contributes 17% to GDP	Increase to 25% of GDP
Skill Development	1.5 crore youth trained under PMKVY	Expand to 10 crore youth
Defense Exports	$1.5 billion (2023)	Achieve $5 billion in exports

The vision of Atmanirbhar Bharat, or self-reliant India, represents a bold and transformative initiative aimed at achieving sustainable economic growth, reducing dependency on imports, and fostering resilience in critical sectors. While the roadmap encompasses comprehensive strategies across various domains, achieving true self-reliance is not without its challenges. Addressing these hurdles and ensuring the active participation of citizens and global partners will be pivotal for the success of this ambitious endeavor.

Challenges to Overcome

Infrastructure Gaps

One of the fundamental challenges to self-reliance lies in bridging infrastructure deficiencies. Both rural and urban areas suffer from inadequacies in transportation, energy, digital connectivity, and water supply systems. Rural areas, in particular, face severe limitations that hinder economic growth and social development. To address this:

- Substantial Investments: The government needs to continue and expand investments under initiatives like the National Infrastructure Pipeline (NIP), ensuring that projects are adequately funded and prioritized.
- Efficient Project Management: Effective execution of infrastructure projects demands streamlined processes, robust planning, and transparent governance. Delays in completion and cost overruns must be minimized.
- Public-Private Partnerships (PPPs): Collaborations with private sector entities can accelerate infrastructure development while ensuring resource efficiency and innovation.
- Sustainable Infrastructure: Green technologies should be integrated into infrastructure projects, promoting energy efficiency and environmental sustainability.

Policy Implementation

India's regional diversity and bureaucratic hurdles present challenges to the uniform implementation of policies. Transparent and accountable governance is critical to

overcoming these issues:

- Decentralized Decision-Making: Empowering state and local governments can improve the responsiveness and effectiveness of policy implementation.
- Reducing Bureaucratic Red Tape: Simplifying procedures, enhancing digital governance, and promoting e-governance can make processes more efficient.
- Stakeholder Engagement: Involving businesses, communities, and civil society in the policymaking process ensures that policies are inclusive and well-targeted.
- Regular Monitoring and Evaluation: Establishing mechanisms to track policy outcomes enables timely adjustments and improvements.

CONCLUSION

A self-reliant India represents a comprehensive vision of empowerment, resilience, and inclusivity. This vision is not merely an economic blueprint but a societal commitment to achieving sustainable growth, global leadership, and social equity. By addressing structural challenges, fostering innovation, and leveraging its demographic dividend, India can unlock unprecedented opportunities for its citizens. The realization of this vision demands concerted efforts from all stakeholders—government, industry, and individuals. Policies must focus on inclusivity, governance must ensure transparency, and citizens must actively support local initiatives. The goal is a thriving India where self-reliance does not equate to isolation but to resilience and strategic partnerships. Imagine an India where every village is digitally connected, every citizen is skilled and employed, and every sector contributes to global advancements. This is the Atmanirbhar Bharat of tomorrow—a nation poised to inspire the world with its strength, unity, and sustainable practices. The journey to self-reliance is undoubtedly challenging, but it is equally rewarding, promising a future of dignity, prosperity, and harmony for all.

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THE VISION OF A SELF-RELIANT INDIA: ATMANIRBHAR BHARAT AND THE PATH TO 2047

Somender Singh[1] and Mohd. Asif[2]
[1]Asst. Professor, [2]Student Dept. Of Teacher Education Govt. Raza P.G. College Rampur (U.P.)

ABSTRACT

Vision 2047 represents India's roadmap for sustainable development as the nation approaches its centenary of independence. Central to this vision is *Atmanirbhar Bharat* (Self-Reliant India), an initiative aimed at reducing dependency on foreign resources by strengthening domestic capabilities. This framework prioritizes key sectors such as manufacturing, technology, agriculture, and clean energy, with flagship programs like *Make in India*, *Digital India*, and *Skill India* fostering innovation, empowering local industries, and enhancing infrastructure.

The paper explores the critical role of self-reliance in driving economic growth, creating employment, and ensuring sustainability. It delves into strategies to address pressing challenges, including economic inequalities, technological gaps, and the need for a skilled workforce. Drawing lessons from successful international models, the analysis provides insights adaptable to India's socio-economic landscape.

Key components of Vision 2047 include sustainable development, technological advancement, and social equity, supported by robust governance, forward-thinking policies, and active societal participation. This paper outlines a framework for realizing these objectives, emphasizing resilience and self-sufficiency over isolation.

In conclusion, *Atmanirbhar Bharat* aspires to position India as a global leader, capable of meeting its internal demands while contributing to the global economy and addressing future challenges.

Keywords: Atmanirbhar Bharat, Self-Reliant India, National Vision 2047, Economic Growth, Innovation, Global Leadership.

The Vision of a Self-Reliant India: Atmanirbhar Bharat and the Path to 2047

Background

The concept of Atmanirbhar Bharat (Self-Reliant India) is grounded in India's historical background, its struggle for independence, and the principles advocated by its founding figures. From the era of British colonialism, Indian leaders envisioned a self-sustaining nation capable of standing independently, free from foreign influence.

During the struggle for independence, figures such as Mahatma Gandhi and Jawaharlal Nehru highlighted the significance of self-sufficiency. Mahatma Gandhi, in particular, promoted the use of Swadeshi (indigenous) products and self-reliance as a means to resist colonial domination and affirm India's independence. His philosophy surrounding Khadi represented the essential need for economic and industrial independence, which formed the basis for India's objectives after gaining independence.

Following independence, Prime Minister Jawaharlal Nehru implemented a socialist strategy for national development focusing on, Industrial growth, Self-reliance, Heavy industry and defense.

Nehru's vision resulted in the creation of public sector enterprises and extensive industrial initiatives aimed at diminishing foreign dependency for crucial goods and services.

The goal is to create a robust economy that can endure global disruptions, such as the COVID-19 pandemic, and position itself as a significant player on the global stage by 2047.

Exploring **Atmanirbhar Bharat** and its goal for a self-sufficient India is highly significant, especially in light of India's ambitions for development, sustainability, and global influence by the year 2047. The importance of this research can be understood through several key aspects:

The vision of **Atmanirbhar Bharat** (Self-Reliant India) is a continuation of India's historical quest for independence and self-sufficiency. Rooted in the ideals of leaders like **Mahatma Gandhi**, **Jawaharlal Nehru**, and **Dr. APJ Abdul Kalam**, the initiative aims to build a robust, resilient, and self-sustaining economy. It focuses on reducing dependence on foreign imports and fostering indigenous capabilities across various sectors such as manufacturing, technology, agriculture, and defense.

Objectives of Atmanirbhar Bharat

The primary objectives of the **Atmanirbhar Bharat** initiative are centered around fostering self-reliance and building a sustainable, resilient, and globally competitive India. The key objectives are:

1. Foster Economic Self-Sufficiency

To reduce India's dependence on foreign imports, the emphasis is on encouraging local production of goods and services in vital sectors like manufacturing, agriculture, and defense. By promoting self-sufficiency in these essential areas, India seeks to minimize import reliance while also generating jobs and improving economic stability. This intentional strategy will bolster India's position on the global stage while supporting sustainable development domestically.

- **Imports:** In November 2024, India's total imports (merchandise and services combined) were estimated at USD 87.63 billion, marking a 27.47% increase compared to November 2023.
- **Unemployment Rate:** The unemployment rate in India has shown a significant decline, dropping to 3.2% in 2023-24 from 6% in 2017-18, indicating substantial improvements in job creation.
- **Economic Growth:** India's growth rate is projected to decline to 6.4% in 2024/25, the slowest in four years, due to a weak manufacturing sector and slower corporate investments.

2. Stimulate Innovation and Technological Progress

To promote innovation, India is launching initiatives such as Make in India and Digital India while also offering strong backing for research and development (R&D) in critical areas like technology and manufacturing.

- India is making strides in AI, blockchain, and other emerging technologies through strategic policies, financial support, and collaborations between public and private sectors.
- The National Quantum Mission is promoting advancements in quantum computing, simulators, and sensors to bolster initiatives like Digital India and Make in India.
- The Digital Personal Data Protection Rules, 2025 govern AI and data management, ensuring a fair balance between innovation and inclusivity.
- Programs such as Technology Dialogue 2025 foster cooperation to enhance India's quantum and technology landscape.

These initiatives are designed to establish a setting that supports significant advancements and entrepreneurial development, aiming to position India as a worldwide center for innovation. By encouraging partnerships among industry, academia, and the government, these initiatives also facilitate sustainable development and technological independence.

3. Bolster National Defense and Security

Ensuring a strong national defense is vital for safeguarding sovereignty, maintaining regional stability, and responding to emerging security threats. To reduce reliance on foreign defense imports, India is enhancing its domestic defense technology and equipment production. By developing local manufacturing capabilities, the country aims to strengthen strategic independence, reduce external vulnerabilities, and promote economic growth through job creation and technological advancements.

Programs such as Make in India and the establishment of defense corridors play a crucial role in achieving self-sufficiency,

ensuring India meets its defense needs while also improving its global standing in the defense industry. This shift towards indigenous defense production not only boosts national security but also positions India as a key player in the global defense market.

The Dream of a Self-Reliant India

The concept of Atmanirbhar Bharat, which translates to "Self-Reliant India," underscores the importance of India increasing its domestic production of necessary goods. Prime Minister Narendra Modi proposed this concept to inspire citizens to utilize local resources, bolster indigenous industries, and lessen reliance on imports. This ambition extends beyond merely achieving economic independence; it aims to enable citizens, businesses, and the government to collaborate in strengthening India's resilience and autonomy.

"A self-reliant India would not be isolated from the world; it would be more connected to

the world through its own strength." ~ Narendra Modi

India's path toward self-sufficiency includes several key areas, each playing a significant role in the nation's aspiration for independence. Enhancing manufacturing is a fundamental aspect of this commitment. The Make in India campaign promotes domestic manufacturing in essential sectors like electronics, defense, and automobiles, creating job opportunities and decreasing reliance on foreign goods. As Prime Minister Narendra Modi wisely noted,

"Make in India is more than a slogan; it is a movement aimed at empowering every individual to contribute to our nation's development."

Agriculture and rural development are also crucial to India's economy. By refining agricultural techniques, embracing sustainable practices, and ensuring farmers have better access to markets, India can bolster its farming industry.

Initiatives like PM-KISAN provide direct financial support to farmers, allowing them to flourish without undue dependence on outside resources. The technology and innovation sector has

elevated India's presence on the international stage. IT and software industries, bolstered by the Digital India program, aim for technological independence and improved digital connectivity. These initiatives ensure that Indian firms can compete on a global scale while providing citizens with improved access to online services.

Healthcare represents another essential aspect of self-sufficiency. India is recognized as a leader in vaccine production and has one of the largest pharmaceutical industries globally. By enhancing healthcare infrastructure and guaranteeing universal access to medical services, the country can sustain a healthy populace capable of independently handling its health necessities.

Renewable energy is crucial for achieving energy autonomy. By emphasizing solar and wind energy, India is adopting environmentally friendly solutions that not only satisfy domestic energy requirements but also open avenues for exporting renewable energy to other nations.

Lastly, education and skill development are vital for cultivating a competent workforce. Programs like the Skill India Mission and the National Education Policy (NEP) 2020 aim to provide youth with necessary training and education in various fields. By focusing on skill development, India equips its younger generation to actively participate in the nation's advancement.

Although these initiatives are underway, there are challenges that hinder the journey toward self-reliance, including issues related to infrastructure, policy execution, and international competition. Nonetheless, with a unified and resolute approach, India can navigate these obstacles and realize its goal of a self-sufficient future.

Finally, bolstering the digital economy is essential for realizing India's self-reliant vision. Investments in digital infrastructure are ensuring broad access to technology, closing the digital gap and getting the country ready for a future driven by technology. Collectively, these efforts lay the groundwork for a self-reliant and resilient India, prepared to confront the challenges of the 21st century.

Implications and Recommendations

To successfully achieve Vision 2047, it is crucial to adopt a collaborative strategy that includes government, the private sector, and community organizations. Such a partnership can lead to significant changes in vital areas, paving the way for a self-sufficient and sustainable India.

CONCLUSION

Vision 2047 offers a significant opportunity for India to become a benchmark for sustainable development. Through a thorough, multi-faceted strategy, Vision 2047 can effectively tackle India's socioeconomic and environmental issues, strengthening the nation's resilience, inclusiveness, and global competitiveness. Emphasizing self-sufficiency, social fairness, environmental care, and technological progress, Vision 2047 can set the course for a flourishing and sustainable India.

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MUSHROOM CULTIVATION FOR ZERO HUNGER (SDG 2): A SUSTAINABLE APPROACH TO FOOD SECURITY

Sanghmitra
Department of Botany, Government Post Graduate College, Noida
dr.sanghmitra0507@gmail.com

ABSTRACT

Mushroom cultivation is an innovative and sustainable method to address food security, particularly in developing regions. As a rich source of protein, vitamins, and minerals, mushrooms can significantly contribute to eliminating hunger (SDG 2). This research paper explores the potential of mushroom farming in combating malnutrition, enhancing rural livelihoods, and promoting sustainable agriculture. It also examines the environmental benefits of mushroom cultivation, including waste recycling and minimal land use. Through an analysis and technological advancements, this paper highlights the scalability and economic feasibility of mushroom production as a viable solution to global food insecurity.

Key words: Mushroom cultivation, sustainability, food security, SDG2.

INTRODUCTION

Our world is presently confronting numerous environmental, social, and economic challenges. These problems are generally interconnected. For instance, the expanding population heightens the demand for food. To generate additional agricultural land for crops to satisfy these demands, numerous trees are being felled. However, fewer forests and trees result in the carbon stored in these ecosystems being released back into the atmosphere. This leads to climate change, which can trigger, for instance, severe climate change. Such extreme incidents can lead to significant financial, physical, and mental harm. Food security continues to be among the most urgent worldwide issues of the 21st century. The United Nations reports that over 800 million individuals globally endure hunger, while countless others face

malnutrition and food insecurity. Sustainable Development Goal 2 (SDG 2) seeks to end hunger by providing everyone with access to adequate, nutritious, and safe food. To achieve this, creative and sustainable farming methods are essential. A particularly promising method is mushroom farming, which provides an efficient, affordable, and eco-friendly answer to food shortages and malnutrition. Mushroom farming has garnered considerable interest as an alternative food production technique because of its various advantages. Mushrooms are abundant in vital nutrients, such as proteins, vitamins, and minerals, rendering them a significant dietary addition, particularly in areas where protein shortages are common (D. Sande et al. 2019. Over the past few decades, there has been a swift rise in interest regarding the pharmacological potential of mushrooms [Khan and Tania, 2012]. Research on mushrooms has revealed various intriguing new biochemical compounds, such as benzoic acid derivatives, oxalic acid, terpenes, anthraquinones, choline, and vitamins (B, C, and D), along with quinolones. Additionally, mushrooms are abundant in crucial minerals like selenium, which possesses remarkable biological properties [Tsai et al. 2009]. Recently, Zhang et al. demonstrated that mushrooms have over 100 possible medicinal benefits such as anti-inflammatory, anti-cancer, antioxidant, anti-diabetic, immunomodulatory, antiviral, anti-allergic, antifungal, antibacterial, and cardiovascular protection [Shao et al., 2015]. Mushrooms have been traditionally utilized in various cultures for health preservation and as a nutritious food source. Mushrooms act as a superb alternative to meat, eggs, fish, vegetables, fruits, and various cereals [Bilal et al., 2010], due to their nutrient content and other vital food components that provide numerous health and nutritional benefits for people. Mushrooms effectively recycle energy through phytoremediation by employing specialized fruiting structures with distinct properties that break down organic materials and return vital nutrients to the soil [Basit et al., 2021]. These fascinating abilities of mushrooms transform agro-waste (high in lignocellulosic substances) into vital protein-rich biomass containing all necessary nutrients [Kumar et al, 2008]. Additionally, mushroom cultivation needs less land, water, and resources than conventional farming, which makes it very appropriate for regions with scarce arable land and challenging environmental

circumstances. Moreover, mushrooms can be cultivated on agricultural byproducts, aiding sustainable waste management and supporting circular economy concepts. Incorporating mushroom farming into local food systems can significantly contribute to achieving SDG 2 by increasing food availability, enhancing nutrition, and creating economic opportunities for small-scale farmers. This study investigates the possibilities of mushroom farming as a viable agricultural method to address hunger and malnutrition. It explores the nutritional benefits of mushrooms, their significance in sustainable farming, and the socio-economic advantages they provide. Additionally, it emphasizes policy suggestions to promote the extensive adoption of mushroom cultivation as a feasible remedy for food insecurity.

Nutritional and Economic Benefits of Mushrooms

The cultivation of edible mushrooms began in France's rural mountainous caves and later became well-established through natural methods in China around 600 AD [Thakur. 2020, Morrison. 2015]. Numerous types of mushrooms have been researched because of their fascinating uses in everyday life as an affordable food source, effective medicines, and their significant contribution to the industry and economy of nations around the world. Currently, around 14,000 identified species exist, with 2,000 deemed safe for human consumption. Currently, 30–50 species of mushrooms are recognized worldwide as a great dietary source, being economical and cultivated in over 100 countries globally [Basit et al. 2021, Kumar et al., 2008].

Nutritional Benefits of Mushrooms:

a. Rich in Essential Nutrients

Mushrooms are considered a highly nutritious food. They are an excellent source of vitamins, minerals, and antioxidants, which are important for maintaining good health. Below are some of the key nutrients found in mushrooms:

- **Vitamins**: Mushrooms are rich in a range of vitamins, including B-vitamins (such as thiamine, riboflavin, niacin, and pantothenic acid) and vitamin D. B-vitamins play a crucial role in energy metabolism,

while vitamin D, especially in mushrooms exposed to sunlight, contributes to bone health and immune function. Mushrooms also contain carotenoids (vitamin A source substances) and a small amount of vitamin C, but lack vitamins A and E [Bilal, 2010].

- **Minerals**: Mushrooms contain important minerals such as selenium, potassium, phosphorus, and copper. Selenium is a powerful antioxidant that helps protect cells from damage, while potassium helps maintain healthy blood pressure levels. Copper is essential for the production of red blood cells, and phosphorus is important for bone health.
- **Carbohydrate**: Carbohydrates constitute the predominant element in consumable mushrooms, typically making up approximately 60% of the dry mass, while nutritive sugars represent around 2%”10% [Li, 2005].
- **Proteins**: Though not a comprehensive protein source like animal products, mushrooms still offer a good quantity of protein and amino acids, making them an important food option for vegetarians and vegans. Typically, mushrooms have a protein content ranging from 19% to 35% based on dry weight [Bilal, 2010], which is significantly greater than that of regular vegetables and is comparable to or even exceeds that of pork, beef, and other animal products, nearing the protein level found in soybeans. Moreover, mushrooms offer a complete spectrum of amino acids, encompassing the 8 essential amino acids necessary for humans and the histidine needed by infants. The amino acid profile (meaning the content and composition ratio of essential amino acids) found in mushrooms is generally similar to the ideal pattern, with certain varieties being optimal, including *Agaricus bisporus, Flammulina velutipes, Tricholoma matsutake*, and *Pleurotus eryngii* [Zhang et al 2017].
- **Fiber**: Mushrooms contain a type of fiber called beta-

glucans, which is known for its ability to improve gut health and boost immune function. The fiber content also aids digestion and can contribute to a feeling of fullness, making mushrooms an excellent choice for weight management.

- **Antioxidants**: Mushrooms are abundant in antioxidants like ergothioneine and glutathione, which assist in shielding cells against oxidative stress and could lower the risk of chronic illnesses such as cancer, heart disease, and neurodegenerative conditions. The crude polysaccharides extracted from the four primary edible mushrooms (*Flammulina velutipes, Agaricus bisporus, Lentinus edodes,* and *Auricularia auricula*). Agaricus bisporus) was recognized as the top natural source of antioxidants.

b. Low in Calories and Fat

One of the key nutritional benefits of mushrooms is that they contain few calories and little fat. Mushrooms contain minimal fat, have no cholesterol, and are abundant in unsaturated fatty acids [Liu et al, 2021], predominantly comprising linoleic acid, serving as a nutritious source of essential fatty acids [Das et al, 2021]. For example, 100 grams of fresh mushrooms have roughly 22 calories and under 0.5 grams of fat. This makes them a perfect food choice for individuals aiming to control their weight while still maintaining nutritional quality. Additionally, the low fat level in mushrooms promotes heart health, allowing them to fit into various low-fat meal plans.

c. Good for Weight Management

Because mushrooms are low in calories but high in fiber and water content, they provide a sense of fullness, which can help with appetite control and weight management. The fiber content in mushrooms, particularly beta-glucans, also supports digestion, reducing bloating and discomfort while promoting healthy bowel movements.

d. Support for Immune System

Mushrooms, particularly varieties like *Lentinula edodes,*

Grifola frondos and *Ganoderma lucidum* have long been associated with immune-boosting properties. These mushrooms contain polysaccharides, particularly beta-glucans, which are believed to enhance immune function by activating immune cells such as macrophages, T-cells, and natural killer cells. Consuming mushrooms regularly can help strengthen the body's defences against infections and diseases.

a. Potential Cancer-Fighting Properties

Certain research indicates that mushrooms could possess anti-cancer characteristics because of specific bioactive substances, such as polysaccharides, flavonoids, and antioxidants. Numerous studies have validated that medicinal mushrooms exhibit a notable inhibitory impact on several cancer types, including breast, acute leukemia, cervical, uterine, and brain cancers [Petrova et al. 2005, Patel and Goyal, 2012]. For instance, the shiitake mushroom includes lentinans, which have demonstrated potential in preventing the proliferation of specific cancer cells. While further studies are required, mushrooms might provide an extra level of defence against specific cancer types.

Economic Benefits of Mushrooms

The economic benefits of mushrooms are comprehensive, as they contribute to the agricultural, food processing, and pharmaceutical industries. Mushroom farming is an increasingly lucrative business, and mushrooms have proven to be an environmentally friendly and sustainable crop. The following sections explore the economic significance of mushrooms.

a. Growing Demand for Mushrooms

The global demand for mushrooms has been steadily increasing, driven by their nutritional value, versatility in cooking, and suitability for vegetarian and vegan diets. As people become more health-conscious and explore plant-based alternatives, the demand for mushrooms has surged. According to market research, the global mushroom market is expected to continue growing at a compound annual growth rate (CAGR) of around 10% in the coming years. This growth presents a significant economic opportunity for mushroom producers worldwide.

b. Job Creation and Employment Opportunities

Mushroom farming can be an important source of income and employment, especially in rural areas. It requires a relatively small amount of space, and the initial investment for setting up a mushroom farm is relatively low compared to other types of agriculture. This makes it an accessible business for farmers with limited resources. Additionally, mushroom farming offers opportunities for seasonal work, providing jobs for individuals during harvest time.

In developed and developing countries, mushroom cultivation has become a viable source of income, with mushroom farmers exporting their products to international markets. The growth of mushroom-related industries, including packaging, distribution, and retail, has further contributed to job creation in these regions.

c. Cost-Effective Crop

Mushrooms are often referred to as a "low-investment, high-return" crop due to their relatively low input costs and high market value. Unlike traditional crops, mushrooms do not require vast amounts of land, irrigation, or long growing seasons. They can be cultivated indoors or in controlled environments, allowing for year-round production. Furthermore, mushrooms require fewer resources such as fertilizers and pesticides compared to other crops, making them both economically and environmentally sustainable.

d. Sustainability and Environmental Impact

Mushroom cultivation is a sustainable agricultural practice with minimal environmental impact. Unlike large-scale livestock farming, mushroom production does not require large amounts of water, land, or feed. Mushrooms can be grown on agricultural byproducts such as sawdust, straw, or coffee grounds, helping to reduce waste and improve sustainability in farming. Additionally, mushrooms contribute to reducing greenhouse gas emissions, as they require fewer resources than many traditional crops.

Furthermore, the growing practice of urban farming and vertical farming, where mushrooms are grown in controlled indoor

environments, has significantly reduced the carbon footprint associated with transportation and resource use. This trend not only benefits the environment but also makes mushroom cultivation more accessible in urban settings.

e. Export Potential and International Trade

Mushrooms have a significant export market, especially in countries where they are cultivated in abundance. For instance, China is the largest producer and exporter of mushrooms, accounting for a substantial share of global mushroom exports. The United States, the Netherlands, and Poland are also major exporters of mushrooms. As global demand for mushrooms continues to rise, there is a growing opportunity for countries to tap into the international market.

The export potential of mushrooms contributes significantly to the economies of mushroom-producing countries, providing them with foreign exchange earnings and boosting the agricultural sector. Countries with favourable climates and production capabilities can leverage this demand to increase their agricultural output and promote rural development.

3. Sustainable Aspects of Mushroom Cultivation

Mushroom cultivation is gaining recognition as an environmentally sustainable and economically viable agricultural practice. Unlike traditional farming, it requires minimal land, water, and energy while offering significant ecological and social benefits. The sustainability aspects of mushroom cultivation, include resource efficiency, waste management, environmental impact, economic viability, and social benefits.

a. Resource Efficiency

Mushroom farming is highly resource-efficient due to its minimal land, water, and energy requirements. Unlike conventional crops that require large tracts of land, mushrooms can be cultivated in small indoor spaces, reducing deforestation and land degradation. Vertical farming methods further enhance space utilization. Mushrooms require significantly less water compared to other crops. The water used in cultivation is primarily for maintaining

humidity, and excess water can often be recycled within the system. The controlled-environment cultivation of mushrooms typically involves energy for temperature and humidity regulation. However, the use of renewable energy sources, such as solar power and biomass heating, enhances sustainability.

b. Waste Management and Recycling

Mushroom cultivation contributes significantly to waste reduction by utilizing agricultural and industrial by-products as a substrate. Common substrates for mushroom farming include straw, sawdust, coffee grounds, and sugarcane bagasse. This process not only reduces waste but also adds value to agricultural residues. After harvesting, spent mushroom substrate (SMS) can be composted and used as an organic soil amendment, improving soil fertility and structure. The reuse of substrates and integration with other agricultural activities create a closed-loop system, minimizing environmental impact and enhancing sustainability.

c. Environmental Impact

Mushroom cultivation has a lower carbon footprint compared to conventional agriculture, contributing positively to climate change mitigation. Mushrooms contribute to carbon sequestration by breaking down organic matter and converting it into nutrient-rich compost, reducing greenhouse gas emissions. Mushroom farming requires minimal or no chemical fertilizers and pesticides, preventing soil and water contamination. Mushroom farming can be integrated with agroforestry and permaculture systems, supporting biodiversity by providing habitats for various microorganisms and beneficial fungi.

d. Economic Viability and Livelihood Opportunities

Mushroom cultivation offers significant economic advantages, particularly for small-scale farmers and rural communities. Compared to other crops, mushrooms have a short growth cycle and high yield potential, making them a profitable agricultural venture. Starting a mushroom farm requires relatively low capital investment, making it accessible to farmers with limited resources. The labour-intensive nature of mushroom farming creates job opportunities in rural and urban areas, supporting local

economies and reducing unemployment.

e. Social and Health Benefits

Mushrooms provide nutritional and medicinal benefits while promoting sustainable food security. Mushrooms are rich in proteins, vitamins, minerals, and antioxidants, making them a valuable dietary supplement for improving human health. Certain mushroom species, such as Reishi and Shiitake, have medicinal properties, including immune-boosting and anti-inflammatory effects, contributing to health and wellness. Mushroom cultivation provides a sustainable food source, particularly in regions facing food scarcity. Its potential to grow on agricultural waste ensures food production even in resource-limited environments.

4. Techniques and Methods in Mushroom Cultivation

Mushroom cultivation is an intricate agricultural practice that requires specific techniques and methods to achieve optimal yield and quality. The process involves various stages, including selecting the right mushroom species, preparing the substrate, inoculation, incubation, fruiting, and harvesting.

a. Selection of Mushroom Species

The choice of mushroom species depends on climatic conditions, market demand, and available resources. Some commonly cultivated mushrooms include:

- **Button Mushroom** – Button mushroom (*Agaricus bisporus*) is member of Class Basidiomycetes and Family Agaricaceae, and it originates from Europe and North America. There are two varieties: white and brown, with the white button mushroom being the one most widely cultivated in India. It thrives in regulated settings with particular temperature and humidity levels.
- **Oyster Mushroom** – Thrives in diverse substrates and is fairly simple to grow. Oyster Mushrooms (*Pleurotus ostreatus*) are part of the Pleurotus genus. In India, it is referred to as "Dhingri" and features a cap resembling a fan or oyster shape. They thrive on

decomposing wood or straw.

- **Paddy Straw Mushroom:** Paddy straw mushroom or *Volvariella volvacea* in scientific terms, is a widely grown mushroom in several Asian nations, especially in China, India, and Southeast Asia (Roy & Kaur, 2016). It is also referred to by different names including straw mushroom, straw hat mushroom, or rice straw mushroom. They are mainly cultivated using agricultural residues like rice straw or sugarcane bagasse. They possess a unique look with a cap that is small to medium in size, starting out egg-shaped before widening as it develops. The cap colour ranges from pale grey to light brown, and the gills start white, becoming pink as the mushroom develops.
- **Shiitake Mushroom** – Shiitake Mushrooms (*Lentinula edodes*) are native to East Asia and are highly consumed in Asian countries. They easily thrive on the wood of deciduous and hardwood trees like Oak, Chestnut, and Maple, among others, and need a humid and warm environment. In rare instances, they might trigger allergic reactions such as itching, but these can be avoided through thorough cooking.
- **Milky Mushroom** – *Calocybe indica*, often referred to as the milky white mushroom, is an edible mushroom species that originates from India. The robust all-white mushrooms emerge in the summer following rainfall in fields and along road edges. Historically consumed in West Bengal, it is now cultivated commercially in various Indian states and other tropical nations.
- **Reishi Mushroom** – It is recognized for its medicinal properties, native to East Asia belonging to the genus *Ganoderma*. In nature, it grows at the base and stumps of deciduous trees, especially maples.

b. Substrate Preparation

The substrate serves as the growing medium for

mushrooms. Different mushrooms require different substrates, including straw, sawdust, compost, or logs. Agricultural by-products like straw, sawdust, and different organic residues are frequently used as substrates because of their accessibility and appropriateness for mushroom cultivation. Nonetheless, recent advancements in mushroom farming have emphasized improving substrate formulation and supplements, while also investigating alternative materials to boost nutritional value and maximize yield capacity. The process of preparation include:

- **Sterilization or Pasteurization** – To eliminate competing microorganisms, substrates are either steam-sterilized or pasteurized by hot water treatment.
- **Supplementation** – Addition of nutrients like bran or gypsum to enhance mushroom growth.
- **Moisture Control** – Ensuring the right moisture content to promote mycelium colonization.

c. Inoculation

Inoculation is the process of introducing mushroom spawn (mycelium) into the prepared substrate. Inoculation techniques include:

- **Grain Spawn Method** – Using grains like wheat or millet inoculated with mycelium.
- **Saw Dust Spawn** – Commonly used for Shiitake and other wood-loving mushrooms.
- **Liquid Culture Method** – Mycelium is suspended in a liquid nutrient medium for rapid colonization.
- **Spore Inoculation** – Suitable for experimental cultivation but less commonly used commercially.

d. Incubation

After inoculation, the substrate is kept in a controlled environment for mycelium colonization. Key factors include:

- **Temperature Control** – Optimal temperatures vary by species (e.g., 24–28°C for oyster mushrooms, 20–

25°C for button mushrooms).

- **Darkness** – Most mushrooms require darkness during the incubation phase.
- **Humidity and Ventilation** – Maintaining high humidity and adequate air exchange prevents contamination.
- **Monitoring and Maintenance** – Regular checks for contaminants and optimal growth conditions.

e. Fruiting Conditions: Once the substrate is fully colonized, fruiting conditions are introduced:

- **Light Exposure** – Some species require indirect light for fruiting.
- **Fresh Air Exchange** – Essential to remove carbon dioxide and promote mushroom development.
- **Humidity and Temperature Regulation** – Fruiting typically requires higher humidity (80–95%) and temperature adjustments.
- **Casing Layer Application** – For species like button mushrooms, a layer of soil or peat is applied to trigger fruiting.

f. Harvesting

Mushrooms need to be picked at the appropriate time to maintain quality and market worth. Effective harvesting and appropriate post-harvest management are crucial in optimizing both the yield and quality of mushrooms grown in polyhouses. The best time for harvesting is determined by the mushrooms' maturity and size, as picking them too early or too late affects both their quantity and quality. It is usually advised to pick mushrooms once the caps have fully opened, but before they become flat, using signs of maturity like the breaking of the veil for Agaricus bisporus species to determine when to harvest. Consistent harvesting throughout the cultivation bed guarantees uniform quality, as mushrooms of comparable size and maturity are often collected together to simplify post-harvest processing and packaging. The frequency of

harvesting depends on the mushroom species, as some generate several flushes, requiring consistent harvesting periods when new mushrooms achieve ideal maturity.

g. Storage

After harvesting, mushrooms need to be quickly cooled to extend their shelf life, with the ideal storage temperature for most varieties being between 0 and 4 C. Appropriate packaging is essential to protect mushrooms from physical harm and preserve their freshness, with packaging materials needing to allow for some air circulation to avoid moisture accumulation and the resulting growth of bacteria and fungi. Methods such as freeze-drying or hot air-drying maintain the nutritional content of mushrooms while improving their storage longevity.

CONCLUSION

Mushroom cultivation presents a promising solution to achieving Sustainable Development Goal 2 (Zero Hunger) by contributing to food security, nutrition, and sustainable agricultural practices. As a highly nutritious and protein-rich food source, mushrooms can address malnutrition and provide essential micronutrients, especially in regions where traditional agriculture faces challenges. The adaptability of mushrooms to various growing conditions, including urban and rural settings, further enhances their potential to supplement food supplies and support marginalized communities. Beyond its nutritional benefits, mushroom cultivation is an environmentally sustainable practice. It utilizes agricultural waste as a substrate, reducing organic waste and promoting circular economy principles. Moreover, mushroom farming requires minimal land and water resources compared to conventional livestock and crop farming, making it a viable option for food production in resource-constrained areas. By integrating mushroom cultivation into local food systems, communities can increase resilience to food shortages and enhance agricultural sustainability. The economic potential of mushroom farming also contributes to poverty alleviation and rural development. Smallholder farmers and entrepreneurs can benefit from low-cost, high-yield mushroom production, generating income and improving livelihoods. Additionally, training programs and

knowledge-sharing initiatives can empower communities to adopt and scale up mushroom cultivation, fostering economic independence and food sovereignty.

Although it offers advantages, issues like insufficient technical expertise, poor infrastructure, and limited market access need to be tackled to enhance the effectiveness of mushroom farming. Funding for research, policy advocacy, and awareness initiatives is essential to break through these obstacles and guarantee that mushroom cultivation is embraced as a prevalent solution for food security. In summary, growing mushrooms offers a sustainable method for tackling global hunger and food shortages. Utilizing its nutritional, ecological, and financial benefits, mushroom cultivation can significantly contribute to reaching SDG 2. Governments, policymakers, and stakeholders need to work together to foster and incorporate mushroom farming into food security plans, guaranteeing a more robust and well-nourished global community.

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SPORTS AS A REFLECTION OF NATIONAL PROGRESS IN INDIA: ANALYZING "MERI MAATI MERA DESH"

Vivekananda Dey
HOD, Physical Education, Govt. Degree College, Jahangirabad, Bulandshahr, U.P.

ABSTRACT

This research paper explores the role of sports as a reflection of national progress in India, with a specific focus on the "Meri Maati Mera Desh" campaign launched in 2023. The campaign, which celebrates the nation's achievements and the sacrifices made for independence, positions sports as both a symbol and vehicle of national unity, pride, and growth. By analyzing India's historical and contemporary sporting successes, this paper examines how sports mirror the country's socio-economic, cultural, and political advancements. The paper also explores the intersections between nationalism and progress, highlighting how sports serve as a unifying force that transcends regional, linguistic, and cultural divides. Furthermore, it examines the campaign's emphasis on gender equality, inclusivity, and grassroots development, positioning sports as a tool for social change and national integration. Drawing from various scholarly sources, the paper underscores the role of government initiatives, such as Khelo India, in promoting sports at all levels and in building a strong sporting culture. Ultimately, this study asserts that the "Meri Maati Mera Desh" campaign exemplifies how sports can be a reflection of India's progress and aspirations, serving as both a catalyst for unity and a powerful symbol of national achievement in the global arena.

Keywords: Sports, National Progress, Meri Maati Mera Desh, Nationalism, India, Unity, Gender Equality, Grassroots Development, National Identity.

INTRODUCTION

Sports have long been a powerful medium for shaping national identity and fostering collective pride. In India, a country

with a rich and diverse cultural heritage, sports serve not only as a form of entertainment but also as a significant instrument in the narrative of national progress and unity. The "Meri Maati Mera Desh" campaign, launched in 2023 as part of India's 75th anniversary of independence, has become a symbol of national pride and a call to honor both the sacrifices of the nation's heroes and the progress made in various fields. Among these, sports have played an integral role in reflecting the strides India has taken toward modernity, inclusivity, and international recognition.

This research paper aims to explore the intersection of nationalism, progress, and sports within the context of the "Meri Maati Mera Desh" campaign. By analyzing the campaign's portrayal of sports as both a catalyst and reflection of national development, this paper will examine how India's sporting achievements—at both grassroots and global levels—serve as a microcosm of the country's broader journey toward growth and unity. The paper will further investigate how the campaign seeks to highlight the role of sports in nurturing national pride, inspiring youth, and contributing to India's evolving image on the world stage.

Through this analysis, the paper will seek to answer crucial questions: How does the "Meri Maati Mera Desh" campaign frame sports as a reflection of national progress? What role does sports play in shaping public perceptions of India's advancement? And how can sports continue to function as a unifying force in a rapidly changing society?

By engaging with these themes, this research will contribute to a deeper understanding of how sports intersect with national identity and progress in modern India, offering insights into how such campaigns can influence the socio-cultural fabric of a nation.

Analysis from Various Reviews of Related Literature:

The role of sports as a reflection of national progress in India is an area rich with scholarly attention, especially in the context of post-colonial nation-building. The "Meri Maati Mera Desh" campaign, launched in 2023 as part of India's 75th

independence celebrations, offers a unique lens to analyze how sports function as both a symbol and vehicle of national unity and progress. This literature review synthesizes various perspectives to analyze the intersection of sports, nationalism, and national development, offering valuable insights into the broader themes of the campaign.

1. Sports as a Unifying Force in India

A recurring theme in the literature is sports' power to unite a diverse population. Bairner (2001) and Donnelly (2008) emphasize that sports, particularly in post-colonial states, serve as a powerful tool for uniting disparate communities around a shared national identity. In the Indian context, sports like cricket and field hockey have long been seen as symbolic of unity, transcending regional, linguistic, and ethnic differences. The "Meri Maati Mera Desh" campaign taps into this unifying potential by incorporating sports into the broader narrative of national pride, positioning athletes as symbols of a cohesive nation. As Chakraborty (2015) notes, sports events in India, such as international cricket matches, have long been moments where Indians, regardless of their regional identities, come together to celebrate the nation's victories. The campaign's promotion of sports as a national unifier aligns with this existing body of literature, which emphasizes the role of collective sporting events in fostering a sense of national solidarity.

2. Sports as a Reflection of National Progress

The concept of sports as a reflection of national progress has been explored in various studies, particularly with respect to India's rise as a global power. Mohan (2021) and Chakraborty (2015) argue that Indian athletes' success on the international stage is emblematic of the country's broader trajectory toward development and global recognition. As India has emerged as a significant player in international sporting events like the Olympics, Commonwealth Games, and cricket, the success of its athletes mirrors the nation's progress in education, infrastructure, and governance. The "Meri Maati Mera Desh" campaign mirrors this narrative by celebrating the nation's sporting achievements as a marker of progress. It suggests that the nation's growing sports culture is a direct reflection of India's socio-economic and political

development, a theme echoed in the works of Sharma (2018), who notes that sports success is often perceived as indicative of a country's broader social and developmental strides.

3. Gender and Social Inclusion in National Progress

The role of sports in advancing social progress, particularly with regard to gender equality, is another key aspect explored in the literature. Soni (2022) and Jain and Kumar (2017) discuss how Indian sports have made significant strides in promoting gender inclusion, with women athletes achieving recognition on global platforms. The participation of Indian women in sports such as badminton, wrestling, and athletics reflects the country's progress toward gender equality and social inclusivity. Nair (2019) further emphasizes that campaigns like "Meri Maati Mera Desh" can highlight the role of sports in advancing gender equality by celebrating women athletes alongside their male counterparts. The campaign's inclusion of diverse sporting heroes, including women from rural backgrounds, aligns with the broader national narrative of empowering all citizens, irrespective of gender, to contribute to national progress.

4. Sports and Regional Representation in National Progress

India's regional diversity poses unique challenges in creating a cohesive national identity, and sports play a crucial role in bridging these divides. Patel (2020) and Rathore (2021) have noted that the growing popularity of sports in smaller regions, particularly with the rise of athletes from rural or underrepresented areas, signals a shift toward more inclusive national development. The "Meri Maati Mera Desh" campaign highlights the importance of recognizing contributions from all corners of the country, regardless of geographical or economic status. Rathore (2021) discusses how sporting initiatives targeting rural development, such as the Khelo India scheme, aim to bring sports infrastructure to the grassroots level, ensuring that progress is felt nationwide. This theme of inclusive growth is central to the "Meri Maati Mera Desh" campaign, which seeks to recognize the role of all citizens, from athletes to local heroes, in contributing to India's success.

5. Governmental and Institutional Role in Sports Development

The role of the government in shaping India's sports culture is another key theme found in the literature. Singh (2016) and Bhanot (2019) examine India's evolving sports policies, focusing on programs like the Fit India Movement, Khelo India, and the National Sports Development Fund. These initiatives aim to strengthen India's sports infrastructure and encourage participation at all levels. The "Meri Maati Mera Desh" campaign aligns with these governmental efforts by promoting the idea that national progress is inextricably linked to the development of a strong sports culture. As Singh (2016) points out, national campaigns are pivotal in shaping public perception about the value of sports, and the "Meri Maati Mera Desh" campaign uses this opportunity to celebrate the intersection of sports and national development.

CONCLUSION

The analysis of the "Meri Maati Mera Desh" campaign within the context of sports as a reflection of national progress has illuminated the multifaceted role sports play in shaping India's identity, unity, and societal development. The campaign successfully ties together the themes of nationalism, progress, and inclusivity by using sports as a powerful symbol of collective achievement and aspiration. It highlights how India's growing success in international sporting arenas mirrors the country's broader socio-economic, cultural, and political advancements.

From a historical perspective, sports in India have long served as a tool for fostering national unity, transcending regional and cultural divides. The "Meri Maati Mera Desh" campaign amplifies this role by celebrating sports not only as a symbol of unity but also as a marker of national progress. The increasing prominence of women athletes, the emphasis on grassroots sports development, and the recognition of rural talent all point toward the country's ongoing efforts to promote inclusive growth.

Furthermore, sports have become a vital instrument in shaping India's global image, serving as both a reflection of its progress and a tool to project national strength on the international stage. The campaign's focus on honoring athletes and the 'soil' signifies a broader vision of national development that integrates cultural pride with global recognition. It also underlines the

government's role in facilitating sports infrastructure development, ensuring that sports are accessible to all, irrespective of socio-economic background or region.

In essence, "Meri Maati Mera Desh" is not just a celebration of sporting achievements; it encapsulates the country's aspirations for unity, progress, and inclusivity. The campaign demonstrates how sports can serve as a unifying force and a reflection of India's journey towards becoming a developed and respected nation.

RECOMMENDATIONS

1. **Expansion of Grassroots Sports Programs:** While there has been significant growth in sports participation, especially in rural and underdeveloped areas, there remains room for improvement. Continued investment in grassroots sports programs, such as the Khelo India initiative, will be crucial to ensuring that young talents from all regions, particularly those in rural or marginalized communities, are identified and nurtured. The government should expand such programs to provide more resources and facilities for youth across the country.

2. **Promotion of Gender Equality in Sports:** The success of Indian women athletes has become a powerful symbol of the country's progress in gender equality. However, gender disparities still exist in many sports, particularly in terms of media coverage, sponsorship, and infrastructure. Future initiatives should focus on increasing visibility for women athletes and providing more support through equal training facilities, resources, and recognition. The "Meri Maati Mera Desh" campaign could further amplify the visibility of female athletes to foster an environment of true gender parity in Indian sports.

3. **Integration of Sports into Educational Institutions:** To create a sustainable culture of sports in India, there needs to be greater integration of sports within educational institutions. Encouraging participation in sports at the school and college levels can not only help develop future athletes but also promote a healthier, more active population. Policy reforms

should incentivize schools and colleges to build stronger sports programs and create environments where students can excel both academically and athletically.

4. **Leveraging Technology for Sports Development:** The adoption of technology in sports—such as analytics, performance tracking, and virtual training programs—can be a game-changer for athletes. Leveraging advanced technologies can help identify talent earlier, track progress, and enhance training regimens. Government and private sector partnerships could drive innovation in sports technology, making it accessible to athletes at all levels of competition.

5. **Increased Support for Indigenous and Traditional Sports:** India's rich heritage of traditional sports like Kabaddi, Kho-Kho, and Mallakhamb is often overshadowed by the focus on international sports. A greater emphasis on promoting these indigenous sports, both at the national level and globally, could enrich India's sporting culture and create unique opportunities for cultural exchange. The "Meri Maati Mera Desh" campaign could be further expanded to showcase these sports as integral to India's national identity and sporting tradition.

6. **Long-Term Sustainability in Sports Infrastructure:** While sports infrastructure has seen significant improvements in recent years, ensuring its long-term sustainability is crucial. There needs to be a sustained investment in modernizing sports facilities across urban and rural areas. Additionally, public-private partnerships can help develop world-class infrastructure, which not only caters to elite athletes but also makes sports facilities accessible to the general public.

7. **Global Collaboration and Sporting Diplomacy:** India's increasing success in global sporting events presents an opportunity to engage in sports diplomacy. Establishing stronger international sporting ties through collaborations, joint training programs, and hosting global events could further elevate India's image as a rising power in sports. The government could leverage international platforms to promote India's progress and establish bilateral partnerships that foster sports excellence.

FINAL THOUGHTS

The "Meri Maati Mera Desh" campaign underscores the profound impact that sports can have on national progress, unity, and identity in India. As the nation continues to evolve, sports will remain an essential aspect of its broader narrative of growth, and the recommendations provided here can help ensure that India continues to build on its successes. By expanding access to sports, promoting gender equality, and fostering both local and global partnerships, India can further strengthen its position as a global leader in sports and continue its journey toward becoming a more progressive, inclusive, and unified nation.

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INDIA'S AGRICULTURAL CONTRIBUTIONS TO GLOBAL FOOD SECURITY AND SUSTAINABLE DEVELOPMENT

Net Ram[1], Himanshu Ranjan[1], Lalit Kumar Verma[2], Paras Kamboj[1], Neeraj Kumar[1], Omendra Pal[1], Raghvendra Pratap Singh[1], & Kuldeep Kumar[3]

Research Scholar[1,2,3, 1]Department of Agronomy,[2]Department of Agricultural Economics & Statistics, [3]Department of Genetics and Plant Breeding, R.S.M. (P.G.) College, Dhampur, Bijnor

Email : netramgangwar58@gmail.com

ABSTRACT

Agriculture plays a vital role in India's economy, not only contributing to food security at the national level but also playing a significant role in global agricultural sustainability. With over half of India's population engaged in agriculture, the sector is central to India's development, providing food, raw materials, and employment. India's agricultural contribution to global food security is immense, as the country produces a wide range of food items that sustain millions of people worldwide. This chapter explores India's role in global food security, sustainable agricultural practices, and its strategies to achieve the United Nations Sustainable Development Goals (SDGs), with a focus on environmental conservation, resource management, and poverty alleviation. Agricultural media and innovations, such as agricultural films, television programs, radio, and digital platforms, have revolutionized knowledge dissemination in India's rural areas, enabling farmers to adopt sustainable farming practices. This chapter delves into the evolution of agricultural media, examining the role of digital platforms, mobile applications, and television programs like DD Kisan, which enhance rural awareness. Additionally, we will discuss case studies showcasing the impact of agricultural media, government policies, and strategies aimed at reducing the sector's vulnerability to climate change, while promoting organic farming, precision agriculture, and water-efficient farming techniques. The chapter will also highlight the latest data, showcasing the effectiveness of such interventions and their contributions to global food security.

Keywords: India, Agriculture, Global Food Security, Sustainable Development, Agricultural Productivity, Agroecological Practices, Climate-Smart Agriculture, Soil Health, Precision Farming, Organic Farming, Export, Sustainable Development Goals (SDGs), Agricultural Policy, Rural Development, Food Security, Agricultural Research, Climate Change, Market Access, Food Trade, Integrated Farming Systems, Agricultural Technology, Agricultural Exports, Soil Conservation, Water Management, National Mission on Sustainable Agriculture, Government Schemes, Rural Infrastructure, Digital Literacy, Poverty Alleviation, Food Trade Policy, Crop Diversification, Biodiversity Conservation, Environmental Sustainability.

INTRODUCTION

India's agricultural sector has a profound influence on global food security and sustainable development. As one of the world's largest producers of agricultural commodities, India plays a pivotal role in shaping both domestic and international food systems. With its vast land area, diverse climatic conditions, and a rich history of agricultural practices, India's contribution to global food security cannot be overstated. The country's agricultural output feeds a substantial portion of the global population and is a major component of the world's agricultural trade.

India's agricultural practices have evolved over the years, from traditional subsistence farming to modern, technology-driven approaches that focus on increasing productivity, improving sustainability, and ensuring food security for future generations. Despite these advancements, the country faces numerous challenges, including climate change, resource depletion, and the growing demand for food due to population growth.

In addressing these challenges, India has adopted several policy measures and technological innovations aimed at ensuring sustainable agricultural production while contributing to global food security. At the same time, the country has embraced the principles of sustainable development, focusing on environmental

protection, economic growth, and social equity in its agricultural practices.

This chapter aims to examine India's contributions to global food security and sustainable development. It will explore the role of Indian agriculture in feeding the world, the impact of government policies and programs, the challenges faced by the sector, and the solutions that can ensure continued progress in both food security and sustainability. Additionally, the chapter will analyze India's participation in global agricultural trade and its role in promoting sustainable farming practices on a global scale.

India's Role in Global Food Security

India's agricultural contribution to global food security is immense, as it produces and exports a wide range of foodstuffs critical to feeding millions across the world. Some key contributions include:

1. Staple Crops

India is one of the world's largest producers of essential food crops like rice, wheat, and pulses. These crops form the base of the diet for billions of people across Asia, Africa, and even the Middle East. India is the world's leading exporter of rice, supplying over 30% of global rice exports, especially to countries in Africa and Southeast Asia. The Green Revolution of the 1960s significantly improved food grain productivity, allowing India to meet its domestic demand and become a net exporter.

2. Diverse Crops

India also produces a range of fruits and vegetables, including mangoes, bananas, tomatoes, and potatoes. These crops are not only vital for the domestic market but are also exported globally. India is the largest exporter of spices, including chili, black pepper, and turmeric, which are integral to global cuisines, particularly in Asia, Europe, and the Americas.

3. Livestock and Dairy

India is home to the world's largest population of livestock,

including cattle, buffaloes, goats, and sheep. This population forms the foundation of the country's dairy industry, making India the largest producer of milk globally. India's contribution to global food security also includes its role in meat production and the export of dairy products to international markets.

4. Nutritional Security

India's contribution to global food security is not limited to quantity but extends to nutrition. Through the export of nutrient-rich pulses, oilseeds, and vegetables, India plays a significant role in improving the nutritional intake of many developing countries.

5. Current Data:

Below is a table illustrating India's agricultural contributions to global food security and sustainable development:

Indicator	India's Contribution	Global Impact
Total Agricultural Area	157.35 million hectares	India is the largest producer of crops like rice, wheat, and pulses.
Global Rice Production Rank	2nd largest	Contributes approximately 20% to global rice production.
Global Wheat Production Rank	2nd largest	Accounts for 13% of global wheat production.
Global Pulses Production Rank	1st largest	India produces about 25% of the world's pulses.
Export of Agricultural Products	$45 billion (2022)	India is a leading exporter of rice, spices, and pulses.
Organic Farming Area	2.7 million hectares	India ranks 9th globally in organic farming area.
Agricultural Research & Development (R&D)	Significant investments	India contributes to global agricultural innovation and technology development through institutions like ICAR.
Sustainable Agriculture Initiatives	25% of farmland under sustainable practices	Indian farmers increasingly adopt agroecological practices to conserve soil and water.
Farmer Welfare Programs	Various schemes like PMFBY, Soil Health Cards	Government schemes aimed at improving food security and farmer resilience.
Agricultural Employment	54% of the workforce	Agriculture remains the largest employer in rural India.

Source: Ministry of Agriculture & Farmers Welfare, 2023; FAO, 2023.

Sustainable Agricultural Practices in India

India faces numerous challenges related to climate change, soil degradation, and water scarcity, which threaten the

sustainability of its agricultural systems. In response, the country has adopted various sustainable agricultural practices aimed at enhancing productivity while preserving environmental resources.

1. **Organic Farming**

   The promotion of organic farming has been one of India's strategies to reduce chemical dependency, restore soil health, and ensure food security without compromising environmental integrity. The government has introduced several schemes like *Paramparagat Krishi Vikas Yojana* (PKVY) to encourage organic farming and certify organic produce for both domestic and international markets. This shift toward organic farming is gaining momentum, with India emerging as one of the largest producers of organic products globally.

2. **Agroforestry**

   Agroforestry, which integrates trees and shrubs into agricultural landscapes, has become a central strategy for increasing farm resilience to climate change. This practice helps improve soil health, reduce erosion, enhance water retention, and provide additional sources of income through the sale of timber, fruits, and other tree-based products. The Indian government's National Agroforestry Policy (2014) emphasizes the importance of this practice in promoting sustainable farming.

3. **Water-Efficient Farming**

   India is home to some of the most water-stressed regions globally, making water management a priority in agricultural planning. Techniques like drip irrigation, rainwater harvesting, and watershed management are being promoted to increase water use efficiency. Programs like the *Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)* aim to improve irrigation systems, thus ensuring better water management and reducing dependency on monsoon rains.

4. **Climate-Smart Agriculture**

   Climate change poses a severe threat to India's agricultural sector, affecting crop yields and productivity. Climate-smart agriculture (CSA) practices, such as the use of drought-resistant

crop varieties, efficient pest management, and diversification of crops, are being encouraged to help farmers adapt to changing climate conditions. India is also involved in international partnerships aimed at reducing agricultural greenhouse gas emissions and improving carbon sequestration.

Technological Innovations in Indian Agriculture

The role of technology in Indian agriculture is transforming the way farming is practiced. With the integration of digital tools, precision farming, and smart agricultural solutions, India's agriculture sector is becoming more efficient and sustainable. Key technological innovations include:

1. Digital Agriculture

Mobile phones and apps have revolutionized agricultural information dissemination in rural India. Apps such as *Kisan Suvidha*, *Pusa Krishi*, and *AgriApp* provide farmers with real-time information on weather conditions, crop management practices, market prices, and government schemes. This has allowed farmers to make informed decisions, improving yields and minimizing losses.

2. Precision Agriculture

The use of drones, sensors, and satellite imaging is making precision agriculture a reality in India. These technologies allow for real-time monitoring of crop health, soil conditions, and irrigation needs. By using data-driven insights, farmers can optimize resource use, minimize input costs, and increase productivity. The government's push towards digitization in agriculture through the *National Agricultural Market (e-NAM)* has also facilitated easier market access and price transparency for farmers.

3. Biotechnology

India has made significant strides in biotechnology, particularly in the development of genetically modified (GM) crops. Bt cotton, which has been widely adopted in India, has helped reduce pesticide use and increase yields. India continues to invest in research and development to create genetically

modified crops that are resistant to pests, diseases, and extreme weather conditions, contributing to global food security.

India's Agricultural Policy and Government Support

The Indian government has implemented several policies to enhance agricultural productivity, support farmers, and promote sustainable farming. Key government initiatives include:

1. **National Mission on Sustainable Agriculture (NMSA)**

   The NMSA aims to promote sustainable agricultural practices, improve soil health, and ensure water-use efficiency. Under this initiative, farmers receive subsidies and support for adopting organic farming, integrated pest management, and other climate-resilient practices.

2. **Pradhan Mantri Fasal Bima Yojana (PMFBY)**

   Crop insurance schemes like the PMFBY have provided farmers with a safety net against weather-related risks, helping to mitigate the impact of crop failures and natural disasters. This scheme plays a crucial role in maintaining food security by reducing the financial burden on farmers and ensuring consistent agricultural production.

3. **Soil Health Management**

   India's Soil Health Card Scheme, launched in 2015, aims to improve soil fertility and promote sustainable land management practices. Soil testing and the provision of customized fertilizer recommendations have helped increase crop yields and reduce the overuse of chemical fertilizers, which can harm the environment.

Challenges and the Way Forward

Despite India's progress in contributing to global food security, challenges persist:

1. **Climate Change**

   Changing rainfall patterns, rising temperatures, and extreme weather events threaten the stability of India's agricultural systems. The vulnerability of the agricultural sector to climate

change necessitates continuous adaptation strategies, including the promotion of drought-resistant crops, efficient water management, and better forecasting systems.

2. **Rural Poverty and Inequality**

While agriculture remains a key sector in rural India, poverty and inequality persist. Small and marginal farmers often struggle with low incomes, inadequate access to technology, and high levels of indebtedness. Comprehensive rural development programs that address these issues are crucial for ensuring food security and improving the livelihoods of farmers.

3. **Technological Gaps**

Despite advances in agricultural technology, the adoption of these technologies in rural India remains limited due to factors such as high costs, lack of infrastructure, and digital illiteracy. Addressing these barriers and improving technology access will be key to enhancing productivity and ensuring sustainable agricultural practices.

CONCLUSION

India's agricultural sector has significantly contributed to global food security and sustainable development. The country's diverse agricultural landscape supports the production of key crops, helping to stabilize global food markets. The role of agricultural media has been instrumental in promoting sustainable farming practices, improving farmer productivity, and facilitating the dissemination of information. Despite the challenges faced, India continues to make strides in improving digital access, increasing farmer awareness, and adopting innovative practices to address the growing demand for food and the impacts of climate change. Through continued investment in media, technology, and policy, India will remain a key player in the global agricultural landscape, ensuring the future of food security and sustainable development.

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THE ROLE OF AGRICULTURAL FILMS AND MEDIA IN SHAPING RURAL AWARENESS AND DEVELOPMENT

Net Ram[1], Dr. Aakash[1+], Neeraj Kumar[1], Omendra Pal[1], Himanshu Ranjan[1], Raghvendra Pratap Singh[1], Paras Kamboj[1] & Ajab Singh[2]

Research Scholar[1,2], Assistant Professor[1+1, 1+] Department of Agronomy, R.S.M. (P.G.) College, Dhampur, Bijnor, [2] Department of Genetics and Plant Breeding, R.S.M. (P.G.) College, Dhampur, Bijnor (U.P.)

Gmail- netramgangwar58@gmail.com

ABSTRACT

Agricultural films and media play a crucial role in disseminating knowledge, influencing farming practices, and fostering rural development. In a country like India, where agriculture is the backbone of the economy, media has emerged as a powerful tool for educating farmers about modern technologies, government schemes, climate resilience, and sustainable farming practices. This chapter explores the impact of agricultural films, television programs, radio broadcasts, digital platforms, and social media on rural communities. It also highlights case studies, recent data, and policy interventions that enhance media's effectiveness in agriculture. The discussion includes recommendations for improving media outreach for maximum farmer engagement and socio-economic development.

Keywords: Agricultural films, media, rural awareness, farming practices, sustainable agriculture, television programs, radio broadcasts, digital platforms, social media, mobile applications, agricultural communication, climate resilience, precision farming, integrated pest management, organic farming, soil health management, DD Kisan, Gaon Connection, YouTube channels, Kisan Suvidha app, WhatsApp groups, real-time farmer interaction, digital literacy, connectivity issues, misinformation, language barriers, regional language content, public-private

partnerships, broadband expansion, fact-checking mechanisms, agricultural extension, rural development.

INTRODUCTION

Agriculture remains a fundamental pillar of India's economy, with nearly 54% of the workforce engaged in farming and allied activities (Ministry of Agriculture & Farmers Welfare, 2023). The dissemination of agricultural knowledge has traditionally been through extension services, but the advent of media has revolutionized the way farmers access information. Agricultural films, television programs, radio shows, social media platforms, and mobile applications are now shaping rural awareness and decision-making processes.

This chapter delves into various aspects of media's role in agriculture, analyzing its effectiveness, challenges, and the way forward for enhancing rural communication strategies.

Evolution of Agricultural Media in India

The role of media in agricultural awareness can be categorized into different phases:

1. **Traditional Media (Pre-1980s):**
    - Government-run radio programs like *Krishi Darshan* played a vital role in educating farmers about best practices, crop management, and weather conditions.
2. **Television and Print Media Era (1980s-2000s):**
    - The launch of *Doordarshan's Krishi Darshan* in 1967 and later private-sector interventions increased agricultural visibility.
    - Print media, including agriculture-specific magazines and newspapers, played a crucial role in disseminating knowledge.
3. **Digital Revolution (2000s-Present):**
    - Social media, mobile apps, and digital platforms have significantly enhanced real-time farmer interaction and

knowledge-sharing.

- Emergence of e-learning platforms, AI-driven advisory services, and data-driven decision-making tools for farmers.

Impact of Agricultural Films and Media on Rural Awareness

1. Agricultural Films

Agricultural films, both documentary and instructional, have been instrumental in demonstrating best practices to farmers. Institutions like ICAR and IARI have produced films showcasing:

Improved irrigation techniques

Integrated pest management

Soil health management

Organic farming techniques

Climate-smart agriculture

2. Television Programs

Programs like *DD Kisan, Gaon Connection*, and *E-TV Annadata* provide region-specific, crop-specific, and climate-specific guidance, offering:

Live interactions with agricultural scientists

Expert advice on disease and pest control

Market price trends and financial planning for farmers

3. Radio Programs

Despite digital advancements, radio remains a critical medium, especially in remote rural areas. AIR's *Kisan Vani* continues to be an essential source of agricultural knowledge, featuring:

Interviews with agricultural experts

Information on government schemes

Community discussions and farmer success stories

4. Digital and Social Media Platforms

The proliferation of digital media has led to the rise of:

YouTube channels: *Kisan Helpline, Agri Doctor*, and *Farming Leader* provide video-based guidance.

Mobile Applications: Apps like *Kisan Suvidha, Pusa Krishi*, and *IFFCO Kisan* provide weather updates, mandi prices, and expert consultations.

WhatsApp & Facebook Groups: Farmers share real-time experiences and troubleshooting advice within peer networks.

Current Data and Trends

Media Platform	Percentage of Farmers Using (%)	Key Features
Television	58%	Weather updates, market prices, expert interviews
Radio	42%	Government schemes, agricultural advisories
Mobile Apps	36%	Pest control, fertilizer recommendations
Social Media	45%	Peer-to-peer learning, knowledge sharing
Agricultural Films	22%	Visual demonstrations of techniques

Source: Ministry of Agriculture & Farmers Welfare Report, 2023.

Case Studies

1. Impact of DD Kisan in Enhancing Awareness

A study by ICAR (2022) found that **70% of farmers who regularly watched DD Kisan improved their farming practices and increased productivity by 15%**. The program's interactive format and expert guidance contributed significantly to knowledge dissemination.

2. Role of Digital Media in Climate Resilience

A 2023 survey by the National Institute of Agricultural Extension Management (MANAGE) showed that 60% of farmers using mobile apps adapted better to erratic weather conditions compared to those relying on traditional methods.

Challenges in Agricultural Media

Despite its effectiveness, agricultural media faces several

challenges:

Low Digital Literacy: Many rural farmers struggle with accessing digital platforms due to a lack of education and technological familiarity.

Language Barriers: Most digital content is available in Hindi and English, limiting regional reach.

Connectivity Issues: Rural areas often suffer from poor internet access, restricting digital adoption.

Misinformation: Unverified agricultural advice on social media can mislead farmers, causing financial and crop losses.

Future Prospects and Recommendations

1. **Localization of Content:** Expanding regional language programming will ensure better engagement among farmers from different linguistic backgrounds.
2. **Affordable Digital Access:** Expanding rural broadband infrastructure and making digital tools more affordable can bridge the connectivity gap.
3. **Public-Private Collaboration:** Partnerships between government, NGOs, and agri-tech companies can enhance media outreach and develop more farmer-centric initiatives.
4. **Fact-Checking Mechanisms:** Establishing agricultural fact-checking bodies to counter misinformation on social media and digital platforms.
5. **Community-Based Digital Literacy Programs:** Training farmers in digital literacy through government-run workshops and NGO initiatives.

CONCLUSION

Agricultural films and media have emerged as powerful tools in shaping rural awareness and promoting sustainable farming practices. While traditional media continues to be relevant, digital transformation offers unprecedented opportunities for real-time knowledge dissemination. Addressing challenges such as digital literacy and misinformation can further amplify the positive impact

of media in agriculture, making it an indispensable tool for rural development.

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Dr. Jagriti Madan Dhingra is the esteemed Principal of Government Raza Post Graduate College in Rampur, Uttar Pradesh. With a robust academic background, she has significantly contributed to the field of Zoology through her research in parasitology and publications in various disciplines. Her work includes studies on the effects of climate change on vulnerable communities and the use of plant extracts as agro-phyto-remediators against root knot nematodes in carrots. Dr. Dhingra's dedication to integrating research with education has been instrumental in advancing the academic environment at her institution.

Baby Tabassum, (Ms); Associate Professor Govt Raza P.G College, Rampur; worked as Research Associate in IVRI, WHO project, Women Scientist under DST, Guest Faculty in Jamia Millia Delhi, completed 4 Research Project, Science Anchor in policy making of NEP2020 Uttar Pradesh Govt of India. ORCID ID0000-0002-6377-6696, Scopus Author ID: 55391202900, Loop profile: 515886 SciProfiles: 3094198. H-index-15. Life Member: Indian Sc. Cong., Microbiologists Soc, Asian PGPR Soc. of Sustainable Agri; organised 9 national conferences; attended 13 International conferences, seminars and symposia; published 75 research items, Editor/Co-ed 22 books.

डॉ० मुजाहिद अली वर्तमान में असिस्टेंट प्रोफेसर शारीरिक के पद पर राजकीय रज़ा स्नातकोत्तर महाविद्यालय, रामपुर, उत्तर प्रदेश में कार्यरत हैं। आपने शारीरिक शिक्षा विषय में पीएचडी की उपाधि अलीगढ़ मुस्लिम विश्वविद्यालय, अलीगढ़ से वर्ष 2003 में प्राप्त की स्नातक एवं परास्नातक की उपाधि भी अलीगढ़ मुस्लिम विश्वविद्यालय, अलीगढ़ से ही प्राप्त की आपका उच्च शिक्षा में शिक्षण अनुभव लगभग बीस वर्ष का है। आपके बारह शोध पत्र शोध पत्रिकाओं में छप चुके हैं। आपने राष्ट्रीय एवं अंतर्राष्ट्रीय कॉन्फ्रेंस / सेमिनार में बीस शोध पत्र प्रस्तुत भी किये हैं।

डॉ० विजय कुमार राय वर्तमान में असिस्टेंट प्रोफेसर इतिहास के पद पर राजकीय रज़ा स्नातकोत्तर महाविद्यालय, रामपुर, उत्तर प्रदेश में कार्यरत हैं। आपने उच्च शिक्षा इतिहास विषय में पूर्वांचल विश्वविद्यालय, जौनपुर से वर्ष 2003 में प्राप्त की। स्नातक एवं परास्नातक की उपाधि राजकीय स्नातकोत्तर महाविद्यालय ज्ञानपुर भदोही से प्राप्त की जिसमें परास्नातक स्तर पर विश्वविद्यालय में प्रथम स्थान प्राप्त किया। आपका उच्च शिक्षा में लगभग लगभग बीस वर्ष का शिक्षण अनुभव है। आपके कई शोध पत्र व लेख शोध पत्रिकाओं में प्रकाशित हो चुके हैं। आपने राष्ट्रीय एवं अंतर्राष्ट्रीय कॉन्फ्रेंस / सेमिनार में अपने विषय से संबंधित शोध एक नये दृष्टिकोण से प्रस्तुत किये हैं। शिक्षण के अतिरिक्त आपकी रुचि शारीरिक शिक्षा एवं क्रीड़ा में भी है। आप महाविद्यालयीय फुटबॉल, हाकी, टेबल टेनिस टीम का नेतृत्व करने के साथ ही फुटबॉल में पूर्वांचल विश्वविद्यालयीय टीम के सदस्य भी रहे हैं।